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XIX.—THE GENUS STRYCHNOS IN INDIA AND THE EAST.

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Owing to the difficulty of arriving at a satisfactory determination of some specimens of *Strychnos* sent to Kew from the Philippine Islands and from Amboina it seemed advisable to re-examine the plants from Malaya generally, and this led finally to a general revision of the genus in India and throughout the East. As a result twenty-two new species and some new varieties have been described. Two species usually regarded as synonyms have been restored and one species has been excluded.

Of the new species three are not very perfectly known, but are sufficiently distinct to justify a description being drawn up.

The present account is far from exhausting our knowledge of the genus in the East, as there is good evidence of several species in Siam, Cochin-China, Borneo, the Philippine Islands, etc., which are represented in herbaria by leaf specimens only, and have not yet been described. Ninety-three species of *Strychnos* have now been described from India and the East by various authors, but as one of these is excluded in the present account the actual number of well-authenticated species in this region is really ninety-two, and of these seventy-eight are represented in herbaria by good and fairly complete specimens.

Our knowledge of these Eastern species has grown somewhat rapidly. De Candolle, in the Prodromus, gives descriptions of eleven species, two being imperfectly known; Bentham, in his account of the *Loganiaceae*, describes fourteen species of *Strychnos*, but suppresses three of those given by De Candolle, and C. B. Clarke in Hooker's "Flora of British India" gives descriptions of nineteen species for India, Ceylon and Malacca, suppressing one of those included in the Prodromus.

In 1907, King and Gamble in "Materials for the Flora of the Malayan Peninsula" describe eleven species, a number which has been increased to fourteen for the peninsula alone in the present enumeration. (*S. pseudo-tieuté*, A. W. Hill, described in *K.B.* 1911, p. 287 is now included under *S. ovalifolia*, Wall. under which species *S. Beccarii*, Gilg, from Borneo, has also been placed.)

Borneo, no doubt, is rich in species of *Strychnos*, but at

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present only five have been identified with any degree of certainty, and three of these also occur in Malaya. From Java and Sumatra six species have been described: one of these is the well-known *S. Tieuté*, which is related to *S. ovalifolia*; *S. monosperma* from Java is imperfectly known, and of the other four, two occur in each island and form two pairs of closely related or representative species.

The Malayan region therefore, including Borneo, Java and Sumatra, is the home of some twenty-two different species of the genus, none of which is found outside that area.

In the *Kew Bulletin*, 1909, pp. 359, 360, four new species of *Strychnos* were described, two being from New Guinea, and the number now known from that island has been raised to eleven, of which eight have recently been collected by Schlechter and by Ledermann, and in addition there is the imperfectly known species *S. Kerstingii*, described in 1901 by Gilg and K. Schum. This latter was the first *Strychnos* to be recorded from the island. One of the New Guinea plants occurs also in Amboina, and a new species is described from that island in the present paper. From the Philippine Islands, *S. multiflora*, Benth., was for many years the only well-authenticated species, though *S. Ignatii*, whose peculiar seeds rich in strychnine had long been an article of commerce, was known to be a native of the islands. Now, thanks to the efforts of Messrs. Elmer and Merrill in particular, thirteen species have been described from the Archipelago, and doubtless there are several others of which we only possess imperfect specimens. From the Celebes, also, there are imperfect specimens preserved in our herbaria.

Both for Ceylon and Southern India two new endemic species are described in the present revision and an interesting new tree species *S. Nux-blanda*, allied to *S. Nux-vomica*, has been identified as the typical species throughout Burma to Siam and French Indo-China.

The genus is richly represented in Siam and Cochin-China, and there appear to be many imperfectly known species. We owe to Pierre the discovery of some seven new species in Cochin-China, and Dop enumerates thirteen species from the French possessions in Indo-China. In the present account the number of species from Cochin-China is fifteen, four new species being described, for it has been found that Dop was incorrect in assigning two plants to the Malayan species *S. Ridleyi* and *S. pubescens*, and was really dealing with two undescribed species, and also that under *S. Gautheriana* three different species were included.

From Siam we now know five species, and the species from this region as would be expected form a connecting link between those from Burma and those from the French Colonies.

In addition to the countries already mentioned there are the Andaman Islands, with at least two endemic species, one being related to the Tenasserim species *S. hypogyna*, the other to *S. cinnamomifolia* from Ceylon. The Island of Narcondam has also a peculiar species, imperfectly known, whose affinities appear to be with Tenasserim. Two endemic species long

known from Hongkong; an imperfectly known species from Formosa, an endemic species in the Fiji Islands and four in Australia, including a new tree species now described for the first time, complete the enumeration.

Classification.

For purposes of classification the Indian and Eastern species may be arranged in four groups or sections, two of which appear certainly to be natural subdivisions of the genus.

The first section (**Brevitubae**) is distinguished by the very short corolla tube, so much so that in some species the corolla appears to be almost polypetalous. In the various species of this section the corolla may be glabrous or hairy within, the anthers glabrous or bearded at the base and the ovary and style either hairy or glabrous.

The second section (**Lanigerae**) also contains species hairy or glabrous as to anthers, ovary and style, but is differentiated by the corolla being provided at the throat with long woolly hairs, and in the corolla tube being about equal in length to the lobes. These two sections contain some thiry-five species, but it is probable that they are not perfectly natural groups, and some of the short-tubed species with woolly hairs at the throat should perhaps be placed among those where the corolla tube approximates in length to the lobes. *S. angustiflora* from Hongkong finds a place in the key to this section, owing to the splitting of the corolla tube producing lobes equal in length to the tubular part of the corolla; but its proper affinity is no doubt among the long-tubed species near to *S. Nux-vomica*.

The third section (**Penicillatae**) appears to be quite a natural and well-defined group, being differentiated by the occurrence of a line of erect bristle-like hairs either across the base or across the middle of the inner face of the corolla lobes. Of the twenty-six species included in the group all except two have glabrous ovaries and styles. The two exceptional cases are species from New Guinea recently described by Gilg which have not been seen; but from the descriptions and figures it would appear that they should be included in this group. All the species in this section have a marked general facies so much so that it is possible for anyone familiar with the genus to assign with some confidence certain flowerless specimens to this subdivision. The anthers are bearded at the base, with the single exception of another New Guinea species *S. Ledermannii*, Gilg & Benedict, which very possibly may not belong to this section.

Had the importance of the character of the corolla hairs in the different species of *Strychnos* been fully recognized by others who have studied the genus, it would have been of value to compare the inter-relationships between the Indian and Eastern species and those endemic in Africa and America. This, however, is unfortunately not possible until a complete re-examination of the African and New World material has been made. In Africa alone some eighty species have been recognised, and many of those collected in Tropical America have not yet been properly determined.

The fourth section of the Indian and Eastern species

(**Tubiflorae**) may also be regarded as a natural one, its main distinguishing feature being the elongated cylindrical corolla tube. Sixteen well-defined species are assigned to this group, and it would appear that relatively large fruits and seeds are correlated with long-tubed flowers; in the case of five species, however, the fruits are unknown. Two other imperfectly known species, *S. donnaiensis* and *S. usitata*, from Cochin-China, no doubt also belong to this section, making a total of eighteen species.

The section falls naturally into two divisions or sub-sections. In one which contains nine well-known and the two imperfectly known species just mentioned, the inflorescences terminate leafy axillary shoots and *S. Nux-vomica* is the typical species. In the other sub-section the flowers are arranged in short, axillary inflorescences furnished only with minute bracts. Of this sub-section *S. Ignatii*, Berg., is the best known species. Glabrous anthers inserted at the top of the corolla tube are characteristic of all the members of the section and the ovary is glabrous in all cases. *S. Wallichiana*, which is placed in this sub-section, should perhaps be more properly put in a division by itself as its long inflorescences, hairy corolla lobes and long style beset with hairs, differentiate it very markedly from all other species with a long corolla tube. *S. angustiflora* also occupies a peculiar position in the *Nux-vomica* sub-section with its deeply split corolla tube, but from the general structure of the flowers, inflorescences and fruits its natural affinity is with the long-tubed species. In the following account the various species are arranged in key form under these four sections.

Habit.

Strychnos is essentially a genus of climbing woody plants living for the most part in moist tropical forests, a few are described as shrubs, and at least six of the species under consideration are trees, namely, *S. Nux-vomica*, *S. Nux-blanda*, *S. potatorum*, *S. arborea*, *S. ligustrina* and *S. polyantha*. There is also probably, in addition to these, another tree in Queensland of which the wood only is known. The tree species are found in relatively dry localities, and occur either in open country or in the drier deciduous forests. It is unfortunate that the information given by collectors as to the general conditions under which the species were growing is as a rule very meagre.

Economic Properties.

Economically, the two most important species dealt with are *S. Nux-vomica* and *S. Ignatii*, on account of the strychnine and brucine contained in the seed. The seeds of *S. lucida*, *S. cinnamomifolia*, and possibly other species, also contain a fair percentage of alkaloids, but there is no evidence that they have been commercially exploited. The bark of *S. Gautheriana*, Pierre, known under the native name "Hoàng Nàn", is said to be very efficacious in cases of leprosy and also to be employed by the natives in Tonkin as an antidote for hydrophobia.*

* Kew Report. 1877, p. 31; Lesserteur, Le Hoàng Nàn, 1879, and *Kew Bull.* 1911, p. 289, where other references are given. See also *S. Gautheriana* (p. 203), where the subject is further discussed.

S. colubrina from S. India has been in repute from early times, under the name "lignum colubrinum," as a specific for snake bite, and it is also used as a tonic in dyspepsia and malaria by the Hindus, no doubt on account of the strychnine contained in the wood of the root. This alkaloid also occurs in the wood and bark of *S. Nux-vomica* (see Fluckiger & Hanbury, Pharmacographia, p. 430), and possibly of other S. Indian species, and it is probable that the products of more than one species of *Strychnos* pass under the name "lignum colubrinum." Rumphius's *Arbor ligni colubrini* is *S. ligustrina*, a species quite distinct from the Indian plant. The bark of the root of *S. Tieuté* also contains strychnine, and yields the poison known in Java as Radja or Tieuté.

The bark of the roots of *S. quadrangularis*, A. W. Hill, from Perak, is used as an arrow poison by the Sakais, and strychnine no doubt also occurs in the root bark of *S. ovalifolia*.

The pulp of the fruits of *S. Nux-vomica* is readily eaten by birds and also by monkeys in India (Fluckiger & Hanbury l.c. p. 428) though it contains some strychnine, and the Shans are said by Burkill to eat the pulp of the fruit of *S. Nux-blanda*, A. W. Hill, which is probably—like the seeds—almost free from alkaloid.

The seeds of *S. potatorum* are well known for their property of clearing muddy water, and the fruit pulp is edible.*

The trees yield good timber which is heavy and close-grained, and characteristically marked with white spots in transverse section (or white streaks in longitudinal section) due to patches of interxylary phloem. Watt Dict. Econ. Prod. India, vi. p. 382 mentions, under *S. Nux-vomica that* "in Burma the wood is used for making carts and agricultural implements and for fancy cabinet work." This, however, as will be shown later, must refer to *S. Nux-blanda* since *S. Nux-vomica* does not occur in Burma.

Among the results of the present investigation perhaps the most interesting is the recognition of this Burmese tree—previously referred to *S. Nux-vomica*—as a distinct and very definite species. Not only can it be recognised by certain well-marked floral and foliage characters, but the fruits and seeds differ in form from those of *S. Nux-vomica*, and the seeds do not contain any appreciable quantity of alkaloid. *S. Nux-vomica* occurs in Ceylon, India extending to Bengal, and is also found in French Indo-China, while *S. Nux-blanda*, the new species, ranges from Manipur, all through Burma to Siam and Cochin-China. Like *S. Nux-vomica*, it is a native of the drier regions and deciduous forests. The recognition of *S. Nux-blanda* has now made it possible to assign to its proper place the Wallichian specimen 1593 from Assam, consisting of leaves only, which Wallich placed under *S. acuminata*.

Geographical Distribution.

Another feature of interest concerns the geographical distribu-

* For further particulars as to the economic uses of the seeds, etc., of *S. potatorum* and *S. Nux-vomica*, see Watt. Dict. Econ. Prod. India.

tion of the species. In the Philippine Islands thirteen distinct and well-marked species have been described and at least six more are represented by imperfect specimens in herbaria. It would appear, though the evidence needs confirmation, that the species are remarkably endemic and that each island tends to have its own particular species which do not occur in the other islands of the group. *S. Ignatii* affords an exception, since it has been collected in Mindanao, Leyte, Samar and Biliran. But these islands are not far apart and, moreover, the wider distribution may be explainable on the grounds of the economic importance of the seeds. Whether *S. multiflora* is confined to the Island of Luzon or whether it also occurs in some other islands is still doubtful; and until better specimens with fruits can be collected of the *multiflora*-like plants from Mindanao, Mindoro, etc., the point must remain unsettled.* A re-examination of the specimens, however, suggests that the species is probably endemic in Luzon. At present we know the following endemic species in these islands:—

Luzon.—*S. multiflora, S. luzonensis, S. Merrillii,* and five imperfect but apparently distinct species.

Mindanao.—*S. Ignatii, S. dubia, S. lanata, S. similis.*

Paragua.—*S. ovata, S. oleifolia, S. impressinervis,* and one imperfect but quite distinct plant.

Leyte.—*S. Ignatii, S. Wenzelii.*

Samar.—*S. Ignatii, S. tesseroidea.*

Biliran.—*S. Ignatii.*

Panay.—*S. panayensis.*

Ticao, Culion and **Mindoro** are each represented by distinct but insufficiently known specimens in our herbaria.

The Philippine species belong to all four sections into which the genus has been subdivided, *S. Ignatii* being the only member of the long-tubed section. As might be expected, none of the Philippine species occur outside the group. *S. similis* shows some similarity to *S. barbata* from New Guinea and also to *S. laurina* from Malaya, but in the absence of complete material the degree of real affinity must remain a matter of conjecture. The relationship of the species belonging to the section *Penicillatae* to extra-Philippine species is no doubt close, but the plants from the islands are very clearly differentiated not only from species native of other regions but also among themselves. *S. Ignatii*, Berg., one of the most striking of the Philippine

* See p. 162 and *Kew Bull.* 1911, p. 300. Since these pages were sent to press, Mr. Merrill, Botanist, Bureau of Science, Manilla, has written as follows:—"In regard to *Strychnos multiflora*, after examining the specimens here, I am inclined to limit the species to Luzon and Mindoro; on account of the imperfect condition of our Mindoro specimens I am not quite sure that they are actually referable to this species. The Culion plant has very immature fruit, and I believe that additional material will show that this too is distinct from *S. multiflora*. I should refer the Clemens specimens from Mindanao to *S. lanata*, but the other Mindanao specimens appear somewhat different. I do not think that any of the Mindanao specimens should be referred to *S. multiflora*, but additional material will be necessary before the specimens can be definitely placed."

species may be related to *S. ovalifolia*, of Malaya, and to *S. cuspidata*, from Borneo, but with its trigonous seeds and large fruits it is unlike any other species, and must be regarded as a plant of considerable antiquity.

The genus therefore appears to afford valuable material for the study of the problems of endemism in the Archipelago, which with the increase of our knowledge will well repay further and more detailed investigation.

The Flora of Ceylon has recently been examined with regard to its endemic constituents, and as Trimen's Flora has been taken as the basis from which deductions have been drawn it is worth while to enquire whether this re-investigation of the genus *Strychnos* affects the discussion to any extent.

Trimen catalogues seven species, three of which he considers endemic in Ceylon; one of these three, however, *S. cinnamomifolia*, is represented in Travancore by so closely allied a variety that the plants from the two localities might almost be considered to be identical. Two varieties, *S. colubrina* var. *zeylanica*, Clarke (=*S. trichocalyx*, A. W. Hill), and *S. Beddomeii* var. *coriacea* (=*S. coriacea*, Thw.), which he places with the plants common to India and Ceylon, have been wrongly assigned to their respective species by C. B. Clarke, and each is now found to be a good species.

The re-examination of all the available material, which is by no means good, has resulted in the recognition of nine Singalese species of *Strychnos*, five of which are endemic. Two of these are represented in S. India by closely allied but easily distinguished species, and three appear to be peculiar to the island.

Particulars are set out in tabular form.

Ceylon.	**S. India.**	**Andaman Is.**
Endemic species.	Representative species.	
S. Benthami, Clarke and vars.	None.	
S. coriacea, Thw. ...		
S. tetragona, A. W. Hill...		
S. micrantha, Thw. ...	*S. colubrina*, Linn.	
S. trichocalyx, A. W. Hill	*S. Dalzellii*, Clarke.	
S. cinnamomifolia, Thw....	*S. cinnamomifolia*, Thw. var. *Wightii*, A. W. Hill.	*S. tubiflora*, A. W. Hill.
Species common to Ceylon and India.		
S. lenticellata, A. W. Hill	*S. lenticellata*, A. W. Hill.	
S. Nux-vomica, Linn. ...	*S. Nux-vomica*, Linn.	
S. potatorum, Linn. ...	*S. potatorum*, Linn.	

Of the species common to Ceylon and India, three (*S. Nux-vomica*, *S. potatorum* and *S. lenticellata*) are dry country plants, and their occurrence in the drier parts of Ceylon, which may be considered both from the physical and geographical standpoint to be part of India, is to be expected. *S. cinnamomifolia* is a moist country plant of the tropical forests, and occurs in India in the forests of Travancore, etc. Here, again, physical conditions are very similar, and the floras of the two regions show

many species in common. It is interesting to notice that a species apparently closely allied to *S. cinnamomifolia* is found in the Andaman islands, but it is sufficiently distinct to be raised to specific rank, and has been described under the name *S. tubiflora*, A. W. Hill. There is also some evidence that *S. cinnamomifolia* may occur in the tropical forests of Silhet, and *S. Pierriana*, A. W. Hill, from Annam (see p. 197) appears to be a very closely allied species.

The species endemic in Ceylon are of interest. *S. micrantha* and its closely allied representative species *S. colubrina* inhabit moist low country somewhat similar to the habitat of *S. cinnamomifolia*. *S. trichocalyx*, and its Indian representative *S. Dalzellii*, appear to be somewhat dry country plants, judging from their general facies and their stout coriaceous leaves. In these two species the hairs on the inside of the calyx lobes are unique in the genus at least as far as the eastern species are concerned. Of the three remaining endemic species *S. Benthamii* with its 4-merous flowers is quite a distinct species peculiar to Ceylon, and occurs as might be expected in the central and southern regions. *S. coriacea*, also peculiar, inhabits the central province, and *S. tetragona* is apparently a low country plant. With its trinerved, closely-veined leaves and glabrous ovary the latter species shows some resemblance to *S. aenea*, A. W. Hill, from Travancore. The anthers, however, in the Ceylon plant are slightly bearded, and the resemblance between the two species may only be superficial. It has seemed desirable to refer to the Ceylon species of *Strychnos* in some detail since erroneous deductions might be drawn from the statements published in Trimen's Flora.

In referring to the Ceylon species the distribution of some of the Indian species has also been considered. There remain, however, in S. India *S. bicirrhosa*, Lesch., from Tanjore, which has not been collected since it was originally found by Leschenault; and *S. colubrina*, the well-known endemic species of the Malabar and Canara coast region.

S. aenea, A. W. Hill, which like *S. cinnamomifolia* var. *Wightii* is a Travancore plant is, like that species, apparently also found in Silhet. The Assam specimens, however, are imperfect and differ in having more abruptly acuminate leaves, but they are so similar to the type from S. India that they have been described as a variety under the name *acuminata*, A. W. Hill. Other closely allied plants, as far as can be determined, are *S. quadrangularis*, A. W. Hill, from the Perak forests, *S. Vanprukii*, Craib, from Siam, and *S. Gautheriana*, Pierre, from Annam (see p. 203).*

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* The Sonerilas of the group *S. squarrosa* and *S. scapigera* occur in S.W. Ceylon, W. Ghats to Bombay, and from Malacca to the Khasia hills and Sikkim (*see* Stapf in Ann. Bot. vi, p. 306). *Chrysophyllum Roxburghii*, G. Don; *Cosmostigma racemosum*, *Fagraea obovata*, Wall. *Pajanila multijuga*, DC. *Sterculia urens*, Roxb. *Dysoxylum binectariferum*, Hook. f. *Amoora Rohituka*, Wight & Arn. *Gomphandra axillaris*, Wall., *Salacia prinoides*, DC. *Ficus retusa*, and *F. nervosa*, show a similar geographical distribution to *Strychnos aenea*, A. W. Hill, and *S. cinnamomifolia* var. *Wightii*.

The Malabar flora shows considerable affinity with that of the Khasia hills and Malaya, as Sir Joseph Hooker pointed out in his Introductory Essay to the Flora Indica (p. 123), and as regards climate, humidity, etc., these regions are remarkably similar. The occurrence therefore of one or two of the same or of closely representative species of *Strychnos* in S.W. India, the Khasia Hills and Malaya is not surprising, although as a rule the range of the several species appears to be restricted.

The Khasia Hills have in addition two endemic species, *S. axillaris*, Colebr., belonging to the section *Penicillatae*, of which several other species are recorded from Indo-China, Malaya, etc., and *S. Wallichiana*, Benth., a very distinct species, which occurs in Silhet, Chittagong and the Lushai hills, with a variety *intermedia*, in Chittagong and a second variety *ovata*, in Pegu.

The typically S. India and Ceylon species *S. potatorum* is also recorded from Prome and Pegu, but *S. Nux-vomica* does not occur, and is represented in Burma and Siam by *S. Nux-blanda*.

The Malayan and Indo-Chinese region is rich in species of *Strychnos*. Ten belong to the section *Penicillatae* and, with the exception of *S. pubescens* which apparently extends to Borneo, they appear to be endemic and well defined. Of the three representative of the section *Brevitubae*, *S. hypogyna* from Tenasserim is nearly related to *S. andamanensis*, but *S. Maingayi* and *S. hirsutiflora* from Perak, are both very distinct and peculiar species.

In the section *Lanigerae*, *S. laurina* from Tenasserim apparently occurs also in Cochin-China and in Borneo, but the evidence rests mainly on the bearded anthers, and it would be unwise to draw deductions as to the inter-relationships of the six species numbered 16–21 in the Key (three of which come from New Guinea and are probably quite distinct, and one from Mindanao, in the Philippines), as in no case is the material sufficiently complete. *S. flavescens*, King & Gamble, from Perak, Penang and Singapore, and *S. Curtisii*, King & Gamble, from Perak and Penang, are well defined species, and are probably endemic.

The only long-tubed *Strychnos* found in the Malay Peninsula proper is *S. ovalifolia*, Wall.; it occurs in Perak, Penang, Malacca and Singapore and extends to Borneo. *S. Tieuté*, Lesch., from Java, is no doubt a closely allied species. Several long-tubed species are known to occur in Cochin-China, but most of the specimens are unfortunately very incomplete. The species from Borneo, Java and Sumatra are distinctly Malayan in their affinities, but it is clear that in Borneo at least there are several species awaiting discovery.

Of the thirteen species described from New Guinea* and Amboina, *S. Forbesii*, *S. barbata* and *S. Robinsonii* are the only ones represented in British herbaria. The two former are evidently closely allied, and show considerable similarities in their flowers

* Gilg & Benedict in Engl. Bot. Jahrb. liv.

and in the possession of large fruits, and probably they are not very nearly related to species from other regions.

Five species, including *S. Robinsonii*, appear to belong to the section *Pencillatae*, but two differ from all others in this section in having pubescent ovaries, and *S. Robinsonii*, is particularly distinguished by its large leaves. No long-tubed species of *Strychnos* is as yet known from New Guinea.

The only species which remain for general consideration are the four from Australia; *S. vitiensis*, the endemic species of the Fiji islands, a plant of very uncertain affinity; the two species from Hongkong and the two imperfectly known species from Formosa and the Celebes respectively.

Of the Australian species *S. lucida*, from the north coast, is closely allied to *S. ligustrina* from Timor and belongs to the *Nux-vomica* subsection of the genus; *S. psilosperma* and *S. arborea* belong to the section *Penicillatae*, and are endemic and quite distinct—*S. arborea* being peculiar, as it is a small tree. *S. Bancroftiana* is very different from any other Australian species; it seems to belong to the *Lanigerae* section of the genus, but flowers are unknown and it may prove to be allied to some New Guinea species, as may also be the case with *S. arborea* and *S. psilosperma*.

The two Hongkong species show no particular affinity to each other. *S. paniculata* has a very short corolla tube and is 4-merous, while *S. angustiflora* has a long cylindric corolla and a large fruit with seeds resembling those of *S. Nux-vomica*. This species no doubt belongs to the *Nux-vomica* subsection of the genus, and the character of the inflorescences also strengthens this assumption, but, owing to splitting, the corolla lobes are almost equal in length to the tube. It is possible that species may be discovered in Cochin-China which will link *S. angustiflora* and *S. Nux-vomica* more closely.

From these introductory remarks it will be obvious that it is not yet possible, even with the large number of fairly well-known species, to suggest definite answers to the interesting questions which are concerned with the geographical distribution of the genus *Strychnos* in India and the East.

The specimens preserved in the Herbaria at Kew, the British Museum, Edinburgh, Glasgow and Paris have been examined, and I am indebted to the Regius Keeper of the Royal Botanic Gardens, Edinburgh, and to Prof. Bower for the loan of specimens. The Superintendent of the Royal Botanic Gardens, Calcutta, also kindly sent over the very rich collection from the Calcutta Herbarium, and I am much indebted to Mr. E. D. Merrill for copious material of *Strychnos* from the Bureau of Science Herbarium, Philippine Islands, and for valuable information. From the Madras and Travancore Herbaria material has also very kindly been sent on loan to Kew. Mr. J. S. Gamble sent the collection from his private herbarium for examination, and I am also indebted to Prof. H. Lecomte for portions of specimens and for much kind assistance during my recent visit to the Museum d'Histoire Naturelle, Paris. Prof. H. Jumelle has kindly sent specimens and seeds of *S. Nux-vomica*

from Cochin-China from the Colonial Museum, Marseilles; and from Dr. Ostenfeld have been received specimens of the two species of *Strychnos* collected on the Danish Expedition to Siam. Specimens of *S. arborea* have kindly been sent by Mr. Maiden from New South Wales, and Mr. White, Acting Government Botanist, has sent interesting Queensland specimens from the Brisbane Herbarium. To Mr. Petch I am indebted for useful material, with ripe fruits and seeds, from Ceylon. The specimens preserved at Kuala Lumpur have also been examined. Unfortunately the Singapore specimens have not been seen, as the risk in having them sent over was considered to be too great.

Clavis specierum.

Section i. **Brevitubae.**

Corollae tubus brevis, lobis tubo longioribus lobis et fauce glabris vel laneo-tomentosis.

Corollae lobi 4 ... ... 1. *S. paniculata.*

Corollae lobi 5 :—

Folia trinervia :—

Antherae glabrae ; inflorescentiae breves, glabrae, compactae :—

Inflorescentiae pauciflorae ; corollae tubus 0·5 mm. longus, lobi marginibus fimbriatis ... ... 2. *S. aenea.*

Inflorescentiae densiflorae ;. corollae tubus 1–1·25 mm. longus, lobi marginibus glabris ... ... 3. *S. Vanprukii.*

Antherae barbatae ; inflorescentiae paniculatae, pubescentes :—

Ovarium cum stylo glabrum ; ramuli minute pubescentes ... ... 4. *S. tetragona.*

Ovarium cum stylo hirsutum ; ramuli glabri :—

Antherae dense barbatae ; corolla extra glabra ... ... 5. *S. Maingayi.*

Antherae paullo barbatae ; corolla extra parce pubescens ... 6. *S. ovata.*

Folia triplinervia vel subquintuplinervia :—

Corolla externe hirsuta vel puberulenta :—

Folia ramulique glabri ; corolla intus glabra vel subglabra :—

Ovarium glabrum ; antherae paullo barbatae ... ... 7. *S. villosa.*

Ovarium puberulum ; antherae glabrae ... ... 8. *S. lanceolaris.*

Folia ramulique pubescentes ; corollae lobi intus pilis laneis obtecti :—

Folia superne glabra ; antherae 0·4 mm. longae ... ... 9. *S. hirsutiflora.*

Folia omnino minutissime pubescentia ; antherae 0·65 mm. longae ... ... 10. *S. bicirrhosa.*

Corolla externe glabra :—
Ovarium glabrum ; antherae barbatae 11. *S. vitiensis.*
Ovarium hirsutum vel subhirsutum ; antherae glabrae :—
Calycis segmenta rufo-pubescentia, obtusa ; corolla 2–2·5 mm. longa ... ... 12. *S. hypogyna.*
Calycis segmenta glabra, subacuta ; corolla 4·5–5 mm. longa ... 13. *S. andamanensis.*
Ovarium hirsutum ; antherae barbatae 14. *S. panayensis.*

Section ii. **Lanigerae.**

Corolla ad faucem vel versus basin loborum et in parte tubi superiore pilis laneis instructa ; lobi et tubus plus minusve aequilongi.
Corollae lobi tubo plus minusve aequilongi :—
Antherae basi plus minusve barbatae :—
Folia trinervia :—
Ovarium glabrum ; corolla 2·5 mm. longa, externe hirsuta ... ... 22. *S. flavescens.*
Ovarium hirsutum ; corolla 4 mm. longa, externe glabra ... ... 15. *S. cinnamophylla.*
Folia triplinervia ; ovarium hirsutum ; corolla 4·5–7 mm. longa, externe glabra :—
Corollae tubus pilis laneis longitudinaliter instructus ... ... 16. *S. septemnervis.*
Corollae tubus, fauce excepto, glaber :—
Corolla 4 mm. longa, ad faucem paullo hirsuta ; ovarium cum stylo parce hirsutum ; pedunculi glabri ... ... 17. *S. Forbesii.*
Corolla 5-6 mm. longa, ad faucem dense hirsuta ; ovarium cum stylo dense hirsutum ; pedunculi pubescentes :—
Folia ovata, paullo triplinervia ... 18. *S. laurina.*
Folia elliptica, conspicue triplinervia :—
Folia anguste elliptica ; antherae fusco - virides ; filamenta 0·75 mm. longa ... ... 19. *S. similis.*
Folia late elliptica ; antherae flavae ; filamenta 1·75–2 mm. longa ... ... 20. *S. barbata.*
Antherae glabrae :—
Ovarium glabrum :—
Folia quintuplinervia ; arbor... ... 21. *S. potatorum.*
Folia trinervia ; frutices :—
Corolla externe hirsuta, 2·5 mm. longa ; antherae raro subglabrae 22. *S. flavescens.*
Corolla externe glabra, circiter 1 cm. longa ... ... 62. *S. angustiflora.*

Ovarium hirsutum :—
Folia trinervia :—
Corolla externe hirsuta ... ... 23. *S. coriacea.*
Corolla externe glabra :—
Corolla 1·1 cm. longa, intus omnino dense hirsuta ... 24. *S. polytrichantha.*
Corolla intus ad faucem hirsuta ; lobi parte superiore glabri :—
Inflorescentiae 8–10 cm. longae :—
Corolla circiter 5·5 mm. longa ; tubus lobis longior ; stylus glaber ... ... 25. *S. dubia.*
Corolla 8 mm. longa ; lobi tubo longiores ; stylus hirsutus ... ... 26. *S. oleifolia.*
Inflorescentiae 2-3·5 cm. longae ; corolla 4 mm. longa ; stylus hirsutus :—
Folia anguste elliptico-lanceolata, acuminata, trinervia vel subtriplinervia ; corollae lobi tubo aequilongi ... 27. *S. micrantha.*
Folia ovato-elliptica, acuta vel acuminata, trinervia vel subtriplinervia ; corollae lobi tubo paullo longiores ... ... 28. *S. colubrina.*
Folia triplinervia :—
Corolla 3·5–4 mm. longa ; antherae orbiculares, 0·65 mm. longae ; stylus hirsutus ; folia parva, glabra, mucronulata ... ... 29. *S. lenticellata.*
Corolla circiter 5 mm. longa ; antherae 0·75–1 mm. longae, oblongae ; stylus hirsutus ; folia acuta vel acuminata :—
Corollae lobi externe minute pubescentes ; foliorum nervi inferne parce pubescentes ... 30. *S. Merrillii.*
Corollae lobi externe glabri ; folia glabra :—
Corollae tubus parte inferiore pilosus ; folia sensim acuta, 8–12 cm. longa ... ... 16. *S. septemnervis* var. *imberbis.*
Corollae tubus parte inferiore glaber ; folia abrupte acuminata, 14–20 cm. longa :—
Antherae subsessiles ; inflorescentiae 3·5–6 cm. longae ... ... 31. *S. pycnoneura.*

Antherae filamenta 1·5 mm. longa; inflorescentiae 12–14 cm. longae ... 32. *S. myriantha.*

Corolla 6–7 mm. longa; antherae 1·65 mm. longae, oblongae; stylus glaber; folia magna, acuta vel acuminata ... ... 33. *S. multiflora.*

Corollae lobi tubo 2.5 mm. longo longiores:—

Antherae 1 mm. longae; filamenta elongata; folia subtriplinervia vel trinervia ... ... 34. *S. Curtisii.*

Antherae 2 mm. longae; filamenta brevia; folia triplinervia ... ... 35. *S. lanata.*

Section iii. **Penicillatae.**

Corollae lobi linea pilorum erectorum instructi.

Corollae lobi linea pilorum ad basin instructi; antherae filamenta in tubo corollae inserta:—

Corollae lobi 4 ... ... 36. *S. Benthami.*

Corollae lobi 5:—

Folia quintuplinervia:—

Folia 8–10 cm. longa, glabra ... 37. *S. quintuplinervis.*

Folia 4·5–6 cm. longa, pubescentia... 38. *S. pubescens.*

Folia triplinervia vel subtriplinervia:—

Plantae glabrae:—

Folia ovata, 5·5–8 cm. longa; corollae lobi pubescentes ... 39. *S. Ridleyi.*

Folia elliptico-lanceolata, 10–16 cm. longa; corollae lobi (linea pilorum excepta) glabri ... 40. *S. Robinsonii.*

Plantae pubescentes:—

Folia omnino rufo-pubescentia; antherae basi et ad margines barbatae ... ... 41. *S. Scortechinii.*

Folia nervis paginae utriusque pubescentibus; antherae basi tantum barbatae ... ... 42. *S. axillaris.*

Folia trinervia:—

Folia ovata vel ovato-lanceolata, subcoriacea:—

Caules uti folia glabri ... ... 43. *S. Schmidtii.*

Caules, petioli et nervi plumoso-pubescentes:—

Caules paullo pubescentes, spinis axillaribus armati; corolla externe glabra ... 44. *S. armata.*

Caules dense pubescentes inermes; corolla externe lineatim pubescens ... 45. *S. plumosa.*

Caules, petioli et folia omnino rufo-pubescentes ... ... 41. *S. Scortechinii.*

Folia rhomboideo-ovata, coriacea :—
Frutex glaber ; venae folii conspicuae ; antherae omnino barbatae ... ... 46. *S. psilosperma.*
Arbor, ramulis petiolis et nervis pubescentibus ; venae inconspicuae ; antherae basi tantum barbatae ... ... 47. *S. arborea.*
Corollae lobi intus linea pilorum erectorum medio notati ; antherae in sinubus insertae :—
Calyx intus versus basin pilis erectis plus minusve lineatim instructus :—
Folia rhomboideo-ovata, basi cuneata, angulis nervorum pagina inferiore saepius pubescentibus ... ... 48. *S. trichocalyx.*
Folia ovato-lanceolata, elongata, glabra 49. *S. Dalzellii.*
Calyx intus glaber :—
Ovarium glabrum :—
Folia quintuplinervia, ovata, basi rotundata ; caules pubescentes :—
Folia superne vernicosa, nervis plus minusve hirsutis ; inflorescentiae axillares ... 50. *S. malaccensis.*
Folia pilis pustulis minutis insidentibus ; inflorescentiae terminales ... ... 51. *S. penicillata.*
Folia triplinervia vel subquintuplinervia, elliptica, basi cuneata vel rotundato-cuneata :—
Caules glabri :—
Antherae barbatae ; pedunculi pedicellique pubescentes... 52. *S. Wenzelii.*
Antherae glabrae ; pedunculi pedicellique glabri ... 53. *S. Ledermannii.*
Caules pubescentes :—
Folia basi cuneata, nervis pagina superiore et inferiore angulis pubescentibus ; calycis segmenta glabra ... ... 54. *S. Horsfieldiana.*
Folia basi rotundato-cuneata, nervis et angulis glabris vel subglabris ; calycis segmenta pubescentia ... 55. *S. palembanica.*
Folia triplinervia vel subtrinervia ovato - lanceolata, acuminata, basi rotundata, 8–13 cm. longa ; caules glabri vel minute pubescentes :—
Caules glabri ; folia venis approximatis ; inflorescentiae terminales ... ... 56. *S. luzonensis.*

Caules in juventute minute pubescentes ; folia venis distantibus ; inflorescentiae axillares vel terminales ... 57. *S. impressinervis.*

Folia trinervia, ovata, 3–6 cm. longa ; caules dense pubescentes :—

Folia emarginata ; inflorescentiae 3–5-florae ... ... 58. *S. mucronata.*

Folia sensim acutata ; inflorescentiae densiflorae ... ... 59. *S. oophylla.*

Ovarium brevissime pilosum :—

Folia ovata, acuta, petiolis glabris ; inflorescentiae pauciflorae ... 60. *S. melanocarpa.*

Folia ovata, longe acutissime acuta ; petiolis parce pilosis ; inflorescentiae multiflorae ... ... 61. *S. polytoma.*

Section iv. **Tubiflorae.**

Corolla cylindracea, elongata, tubo—*S. angustiflora* excepta—lobis multo longiore.

Inflorescentiae ramulos axillares foliatos terminantes :—

Corolla fissa, lobis tubo plusminusve aequilongis ... ... 62. *S. angustiflora.*

Corolla tubo lobis multo longioribus :—

Arbores :—

Folia magna, 5-7-nervia; corollae tubus intus pilosus :—

Folia 5-nervia, sensim subacuta, usque ad 15 cm. longa ; antherae non-apiculatae ; semina orbicularia, nitide sericeo-hirsuta ... ... 63. *S. Nux-vomica.*

Folia 5-7-nervia, abrupte acuta vel acuminata, usque ad 22 cm. longa ; antherae apiculatae ; semina irregulariter ovoidea, indumento contexto hebete obtecta ... 64. *S. Nux-blanda.*

Folia parva, emarginata, 3-nervia ; corollae tubus intus glaber... 65. *S. ligustrina.*

Frutices vel scandentes :—

Frutex ; ramuli divaricati ; folia griseo-viridia ; corollae tubus intus glaber ... ... 66. *S. lucida.*

Scandentes ; corollae tubus intus pilosus :—

Folia triplinervia ; pedicelli pubescentes ; pericarpium crassum, conspicue verruculosum ... ... 67. *S. cinnamomifolia* et var. *Wightii.*

Folia trinervia; pedicelli pubescentes vel glabri :—
Folia ovata, abrupte acuta vel acuminata; pedicelli glabri; pericarpium crassum, verruculosum 68. *S. tubiflora.*
Folia ovata, acuta; pedicelli pubescentes; pericarpium tenue, laeve ... 69. *S. rupicola.*
Folia elliptica, abrupte acuminata vel acuta; pedicelli pubescentes; pericarpium crassum ... 70. *S. Pierriana.*
Inflorescentiae axillares efoliatae : —
Inflorescentiae elongatae, multiflorae; stylus hirsutus ... ... 71. *S. Wallichiana.*
Inflorescentiae breves; stylus glaber :—
Corollae lobi villosi ... ... 72. *S. Spireana.*
Corollae lobi glabri :—
Folia trinervia vel subtriplinervia :—
Corolla 8 mm. longa; tubus intus dense lanatus; folia longe acuminata... ... 73. *S. cuspidata.*
Corolla 1·2–1·5 cm. longa; tubus intus paullo lanatus :—
Folia ovata; bacca 4–5 cm. diametro; semina elliptica vel rotundata, compressa.. 74. *S. Balansae.*
Folia elliptica vel obovato-elliptica; semina subtrigona, cornea ... ... 75. *S. Ignatii.*
Folia triplinervia :—
Semina pilis laneis intertextis dense vestita ... ... 76. *S. Tieuté.*
Semina pilis sericeis nitentibus dense vestita ... ... 77. *S. ovalifolia.*

Section i. **Brevitubae.**

1. **S. paniculata,** *Champ.* in Hook. Kew Journ. Bot. v. p. 56, descr. emend.

Corolla 3·75–4 mm. longa, ad faucem pilis longis laneis instructa, tubo 1 mm. longo. *Antherae* 1·25 mm. longae, basi retrorso-villosae. *Ovarium* glabrum, stylo 2·5 mm. longo glabro vel subglabro; Benth. in Proc. Linn. Soc. Bot. i. p. 102; Walp. Ann. v. p. 508; Benth. Fl. Hongk. p. 232; Forbes & Hemsley, Ind. Flor. Sin. ii. p. 121; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19. (1910), p. 15; Dunn & Tutcher, Flora of Kwantung and Hong Kong, Kew Bull. Add. Ser. x. 1912, p. 174.

Hongkong. *Wright* 267; *Champion* 329; *Wilford* 429.

Kwantung. Canton, *Reeves.*

This species is easily distinguished by its 4-merous flowers. The small button-like seeds are practically glabrous.

2. **S. aenea,** *A. W. Hill*; species tubo corollae breve, inflorescentiis glabris filamentis antherarum elongatis, foliis subtus aeneis distincta.

Frutex lignosus, scandens, glaber, ramis plus minusve quadrangularibus angulis subcarinatis. *Folia* ovato-lanceolata, 9-15 cm. longa, 4-6·5 cm. lata, basi cuneata vel rotundato-cuneata, apice sensim acuminata, 5-nervia, trinervia, nervis utrinque elevatis, pagina superiore in siccitate lacte viridia, inferiore aenea, venis reticulationibusque conspicuis; petioli breves; cirrhi bijugi, glabri. *Inflorescentiae* axillares, pauciflorae, circiter 2 cm. longae, pedunculis pedicellisque glabris. *Calycis* segmenta

ovato-lanceolata, acuta, 1·25 mm. longa, marginibus paullo fimbriatis. *Corolla* 3-4 mm. longa, tubo 0·5 mm. longo vel breviore; lobi elliptico-ovati, subacuti, pilis minutis marginibus et ad apices fimbriati, intra et ad faucem pilis laneis minutis instructi. *Antherae* 0·75 mm. longae, glabrae, filamentis 1·5-2 mm. longis. *Ovarium* cum stylo 0·75 longo glabrum. *Fructus* ignotus. *S. Rheedii*, Brandis, Indian Trees, p. 474, non Clarke in Hook. f. Flor. Brit. India, iv. p. 87.

S. India. Travancore: Peermerd; evergreen forests, 1120 m., *Bourdillon* 200; Ponmudi: evergreen forests, 760 m., *Bourdillon* 600; S. Canara, *Beddome* 5306 in herb. Mus. Brit.; Anamali Hills. 900 m., *Fischer* 3579; Udumanpari, *Barber* 5715.

Var. **acuminata.** *A. W. Hill. Folia* plus minusve late ovata, 9-10 cm. longa, 4-5·5 cm. lata, abrupte et longe acuminata, pagina inferiore aenea. *Inflorescentiae* axillares, 3-3·5 cm. longae, glabrae. *Flores* perfecti ignoti.

N.E. India. Cachar: Kala Naga, *Prazer* 171 in herb. Calc.; Khasia Mts., *Hooker & Thomson* in herb. Kew.: without precise locality, *Wallich* 1590 partim. in herb. Mus. Brit.

There is a Banksian specimen, no. 84 in the British Museum, with a note by Dryander "v. Hort. Malab. Tom. 1. tab. 37", apparently received from a Dutch collector, which should probably be referred to this species.

In the Flora of British India, Clarke gave a description of *S. Rheedii*, based entirely on the picture in Rheede Hort. Malab. viii. t. 24, and Brandis in his "Indian Trees" assigned to this species specimens from Travancore collected by Bourdillon. Rheede's figure is accompanied by no description of any value, and it is very doubtful what his plant may have been. The flowers appear to have a short tube, but the large globular fruits and flattened discoid seeds so closely resemble those of *S. Nux-vomica* that it seems highly probable they belonged to that species, while the leaves and flowers may have been those of another plant.

Under the circumstances, therefore, it seems better not to refer any of our modern specimens to Clarke's *S. Rheedii*, as Brandis has done, nor attempt to reconcile them with Rheede's figure, but to describe them as a new species and place *S. Rheedii*, Clarke, among "species excludenda." (See p. 208.)

Bourdillon describes the plant as a large woody climber, flowering in April and May. It occurs in the tropical evergreen forests of Travancore, and is especially marked in having quadrangular stems, in the trinerved leaves which when dry are copper-coloured on the under surface, and the small glabrous inflorescences. These characters are also possessed by the specimens from Perak, to which the name *S. quadrangularis*, A. W. Hill, has been given (see p. 205) and by the specimens of the true *S. Gautheriana*, Pierre, from Annam (see p. 203). Unfortunately no perfect flowers of either the Perak or Annam plants are known, though in the former the ovary and style are glabrous as in *S aenea*; and it is therefore somewhat doubtful whether the resemblances represent a real affinity. Such a distribution, however, as the moist evergreen forests of Travancore, Silhet Perak and the calcareous mountains of N. Annam is not unknown. The marked affinity of *S. aenea* with the Siamese *S. Vanprukii* is also of interest geographically.

The three specimens referred to the variety *acuminata* agree fairly closely with those of the type from Travancore, and the distribution of the species closely resembles that which apparently obtains in *S. cinnamomifolia*, Thw., and its Indian variety (see p. 194). The leaves in the variety have rather long drip tips, and the stems appear to be rounded rather than quadrangular.

3. **S. Vanprukii,** *Craib* in Kew Bull. 1911, p. 421. descr. emend.; species *S. aenea*, A. W. Hill, arcte affinis, inflorescentiis densifloris, corollae tubo longiore lobis ellipticis marginibus glabris differt.

Folia 8–17 cm. longa, 3–7 cm. lata, trinervia vel subtriplinervia. *Cymae* axillares, paniculatae, 2–3 cm. longae. *Corolla* 3-4 mm. longa, intra ad faucem praecipue pilis minutis laneis instructa, tubo 1–1·25 mm. longo. *Antherae* glabrae, filamentis

1-1·5 mm. longis instructae; Lecomte, Flor. Gén. Ind.-Chin. iv. p. 164.

Siam. Me Yuak Phre, 240 m. *Luang Vanpruk* 234; Pre Hue Oi, 300 m., *Luang, Vanpruk* 410.

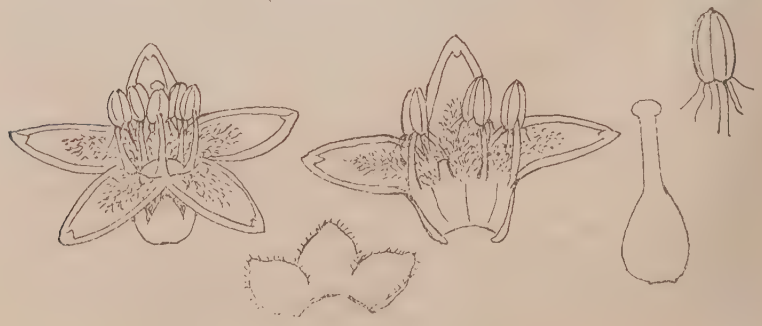
The receipt of a second specimen of this species has necessitated a slight revision of the original description since the leaves are considerably smaller and the inflorescences more expanded than in the type specimen; the two gatherings agree in all other essential respects.

In his original description Craib compared the plant with *S. paniculata*, Champ.; it appears, however, to be very closely allied to *S. aenea*, A. W. Hill, from Travancore. The whitish-green of the upper surface of the leaves, short axillary panicles, triangular-acute calyx segments, the corolla lobes and throat with a covering of short woolly hairs, the anthers and the glabrous ovary and style are remarkably similar in both species. The chief points of difference are to be found in the fringe of hairs to the elliptic corolla lobes in *S. aenea*, the shorter corolla tube, the somewhat larger calyx segments, and the coloration of the under surface of the leaf. It is unfortunate that we do not know the fruits and seeds of either *S. Vanprukii* or *S. aenea*, as without them the affinity of the two species is rather a matter of conjecture.

Vanpruk describes his no. 410 as a woody climber over 50 ft. long.

4. **S. tetragona,** *A. W. Hill*, species ramulis et pedunculis tetragonis, corolla campanulata tubo breve lobis repandis, antheris barbatis, ovario glabro distincta.

Frutex ramis sulcatis in juventute tetragonis pubescentibus. *Folia* ovata vel obovato-elliptica, basi rotundata vel rotundato-cuneata, apice acute et longe acuminata, 6–9 cm. longa, 3–4 cm. lata, 5-nervia, trinervia, superne vernicosa, nervis impressis, pagina inferiore nervis minute pubescentibus petioli circiter 5 mm. longi. *Inflorescentiae* axillares, paniculatae, 2·5–5 cm. longae, pedunculis pedicellisque tetragonis sulcatis pubescentibus. *Calycis* segmenta triangulari-ovata, 0·75 mm. longa, plus minusve acuta, glabra, marginibus ciliatis. *Corolla* 3·5 cm.



longa, lobis repandis circiter 2·5 mm. longis plurime et ad faucem pilis laneis dense instructis, tubo campanulato glabro. *Antherae* circiter 1 mm. longae, ovatae, basi paullo barbatae vel subglabrae, filamentis 0·75–1 mm. longis. *Ovarium* globosum, cum stylo glabrum 2·25 cm. longum. *Fructus* ignotus. *S. micrantha*, Thwaites, Enum. Plant. Zeyl. Add. p. 425; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 86; Trimen, Fl. Ceylon pt. iii. p. 172, omnes quoad *C.P.* 3720 partim.

Ceylon. Without precise locality, *Thwaites* 3720. B. in herb. Kew.

This plant, included by Thwaites under *S. micrantha*, is quite distinct from the other plants placed by him under that species. The pubescent twigs and the pubescent nerves on the under surfaces of the leaves, the short campanulate corolla tube, bearded anthers and glabrous ovary and style mark this plant as a well-defined species.

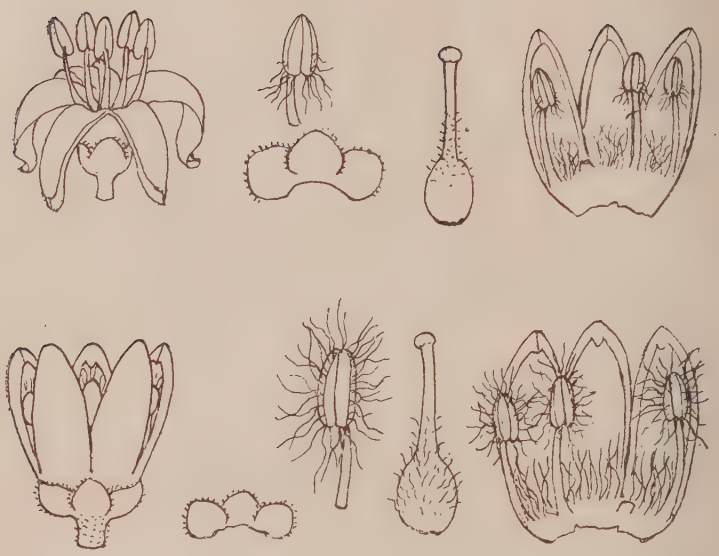
There are two distinct plants at Kew bearing the original label *Thwaites* 3720, one of which is rightly referred by Thwaites (Enum. p. 425) to *S. micrantha*. It was originally labelled *S. laurina* and is included by C. B. Clarke (Fl. Brit. Ind. iv. p. 88), under *S. Beddomei*. The other plant—the type of the new species—was also seen by Clarke and placed under *S. micrantha* (Fl. Brit. Ind. iv. p. 86), for he refers to the glabrous ovary of *C.P.* 3720, although Thwaites, in his description, states that the ovary in *S. micrantha* (Enum. p. 425), is villous. *S. micrantha*, according to Clarke, l.c., is represented by *C.P.* 3720 (B.) and *C.P.* 1866, the latter a doubtful fruiting specimen—while *S. micrantha*, Thwaites, includes *C.P.* 3540, 3720 (A)—of which there are two sheets at Kew—and 1866. In order to reconcile his own conception of *S. micrantha*, Clarke has removed nos. 3540 and 3720 (A), with the ovary hairy, to his *S. Beddomei*—which is here considered synonymous with *S. colubrina*, the South Indian species (see p. 157).

It is unfortunate that we have no definite knowledge of where this endemic species was collected. Since it bears the same number as specimens belonging to *S. micrantha*, Thw., it may perhaps be concluded that it is a native of the low country (see Trimen, Flor. Ceylon, iii. p. 172).

In its leaf and floral characters it shows some resemblance to *S. aenea*, A. W. Hill. It differs especially in the slightly bearded anthers, the pubescent stems, and larger paniculate infloresences.

5. **S. Maingayi,** *Clarke* in Hook. f. Fl. Brit. Ind. iv. p. 88, var. excl.; descr. emend.

Corolla 3–3·25 mm. longa, tubo 0·5 mm. longo glabro, lobis elliptico-ovatis ad basin linea pilorum laneorum notatis. *Antherae* 0·9–1 mm. longae, basi et ad margines dense villosae, filamentis 1·5 mm. longis in sinubus insertis. *Ovarium* inferne glabrum, in parte superiore et cum stylo pilis erectis instructum; stylus 2 mm. longus, crassus; stigmate capitato. *Fructus* circiter 2-2·5 cm. diametro (*King's Coll.* 6921, *Maingay K.D.* 1035);



Figures in upper row from *Maingay* 1975; those in lower row from *L. Wray* 4279. All the figures are from drawings by Miss M. Smith.

pericarpium laeve, crustaceum, 0·25 mm. crassum. *Semina* 2, circiter 1·3 cm. diametro, orbicularia, plano-subconvexa, compressa; King & Gamble in Mat. Flor. Mal. Penins. iv. p. 824, spec. *King's Collector* 8190 excl. *S. laurina*, Clarke in Hook. f. Flor. Brit. Ind. iv. p. 88, quoad fruct. descr. *S. laurina*, King & Gamble, l.c. p. 825, quoad *Maingay K.D.* 1035.

Malay Peninsula. Perak: Selama; Plains, *Wray* 4279, 3112; Ulu Leding, *Wray* 2009; dense jungle, 30 m., *King's Collector* 6291; *Scortechini* 1026.

Malacca: *Maingay* 1975, 3393 (*K.D.* 1035), 1042.

According to the collector's labels, *S. Maingayi* is a shrubby creeper, 10–15 ft. long. It is an easily recognised plant by its glabrous, highly polished, trinerved leaves and by the numerous small lenticels often transversely split and almost circular in outline. The leaf venation is obscure on the upper surface but fairly evident on the lower side. The fruit is about an inch in diameter, according to the two fruiting specimens assigned to this species. One of these, *Maingay* 3393 (*K.D.* 1035), was included by Clarke under *S. laurina*, Wall., and is the specimen from which the fruits of *S. laurina* in the Flora of British India are described; King & Gamble have accepted Clarke's identification. There can be little doubt, however, that Maingay's Malacca specimen is quite distinct from *S. laurina*, Wall., gathered in Tenasserim.

The Perak plants, especially *Wray* 4279 (see figs.), differ slightly from Maingay's Malacca specimen in the greater development of the anther hairs. The anthers in the Perak plants are densely hairy not only at the base but also all along the margin or line of dehiscence of the anther cells.

Maingay K.D. 1038, on which Clarke founded his doubtful variety *fructuosa* (Flor. Brit. Ind. iv. p. 88), proves to belong to *S. ovalifolia*, Wall.

King's Collector 8190, a fruiting specimen from the Goping District, Perak, cited under *S. Maingayi*, by King & Gamble l.c. is wrongly assigned to that species and should be referred to *S. Curtisii*, King & Gamble. It differs from fruiting specimens of *S. Maingayi* more particularly in the shape of the lenticels, the stouter, more coriaceous leaves with inconspicuous veins, and in the larger fruits.

Curtis 3667, from Penang, has unfortunately not been seen.

6. **S. ovata,** *A. W. Hill* in Kew Bull. 1909, p. 360; descr. emend. et ampl.

Folia trinervia. *Calyx* 0·75-1 mm. longus, segmentis orbiculari-ovatis subacutis marginibus pubescentibus. *Corolla* extra parce pubescens, 3-3·25 mm. longa, lobis glabris 2·25-2·5 mm. longis, tubo 0·75 mm. longo ad faucem tantum lanceis hirsutis instructo. *Antherae* 0·75 mm. longae, basi barbatae, filamentis 0·75-1 mm. longis. *Ovarium* ovoideum, superne hirsutum, cum stylo 3 mm. longum; stylus ad basin hirsutus, 1·75 mm. longus. *Fructus* globosus (*Merrill* 9431), 1·7 cm. diametro, 1-2 spermus (?); pericarpium laeve, crustaceum, vernicosum; A. W. Hill in Kew Bull. 1911, p. 295.

Philippine Islands. Palawan 'Paragua,' *Vidal* 3315; Apulit Island; Taytay Bay (May), *Merrill* 9431 (?).

In preparing the original description the beard at the base of the anthers was overlooked and the species is wrongly placed in the key given in *K.B.* 1911, p. 286; it appears to be allied to *S. barbata*, A. W. Hill, though the corolla tube is much shorter. The corolla lobes are glabrous, but there is a dense ring of woolly hairs at the throat of the corolla. The top of the ovary and the base of the style are beset with erect hairs. Merrill's specimen from Apulit Island in Taytay Bay at the N.E. end of Palawan or Paragua almost certainly belongs to *S. ovata;* the flowers unfortunately are immature, but the woolly character of the corolla hairs, the bearded anthers and hairy style can be seen. The fruit is a small globular berry with a thin brown polished pericarp.

Whitford's specimen from Lamao river, in the Province of Bataan, Luzon (in herb. Bur. Sc.) resembles *S. ovata*, especially *Merrill* 9431, but the corollas have fallen, and the fruit is certainly larger.

7. **S. villosa,** *A. W. Hill* in Kew Bull. 1911, p. 296; descr. emend.

Antherae basi paullo barbatae.

Java. Wukau, *Horsfield* 1319; without locality, *Kurz.*

S. villosa and *S. lanceolaris* appear to be closely allied and in both species the corolla is hairy outside; in *S. lanceolaris* however, the corolla is glabrous within while *S. villosa* bears scattered woolly hairs on the corolla lobes. The anthers are slightly bearded at the base and not glabrous as stated in the original description.

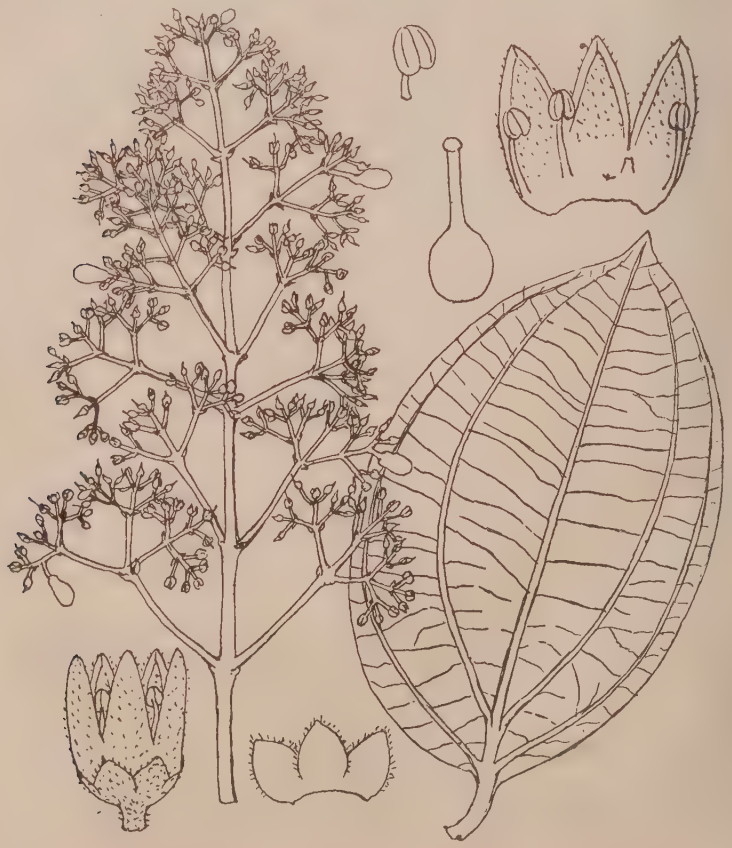
As the flowers are immature it may be that this species really belongs to the section with woolly hairs at the throat and a well-developed corolla tube.

8. **S. lanceolaris,** *Miq.* Flor. Ind. Bat. Suppl. pp. 227, 551, descr. emend.; A. W. Hill in Kew Bull. 1911, p. 295.

Sumatra. *Korthals* in Herb. Lugd. Bat.; Palembang, *Teysmann.*

9. **S. hirsutiflora,** *A. W. Hill*; species foliis quintuplinerviis, corollae lobis paginae utriusque hirsutis antherisque glabris distincta.

Frutex scandens, 30 m. longus; caulis 8-10 cm. diametro, ramis cortice striato dense ferrugineo-tomentosis. *Folia* ovato-elliptica vel ovata, 7-9 cm. longa vel ultra, 4-4·7 cm. lata, superne



vernicosa, glabra, inferne omnino sparse et ad nervos praecipue ferrugineo-pubescentia, quintuplinervia, venis approximatis conspicuis; petiolis pubescentibus. *Inflorescentiae* axillares vel terminales, laxe paniculatae, multiflorae, 15-30 cm. longae, foliaceae; pedunculis lateralibus 2-3 cm. longis pedunculis pedicellisque dense ferrugineo-hirsutis. *Calycis* segmenta anguste ovata, acuta vel subacuta, 0·75 mm. longa, pubescentia, marginibus ciliatis. *Corolla* 1·75 mm. longa, lobis triangulari-ovatis acutis 1·25 mm. longis externe et interne parte superiore pilis substrigosis instructis, tubo et fauce glabro. *Antherae* orbiculari-ovatae, 0·4 mm. longae, glabrae, filamentis 0·5 mm. longis in sinubus insertis. *Ovarium* globosum, cum stylo glabrum 1·5 mm. longum. *Fructus* immaturus, pyriformis, 1·3 cm. longus, 7 mm. diametro.

Perak. Mixed forest clinging to a large tree; 120-180 m. (June), *King's Collector* 10311.

The flowers are said to be pale green-yellow. With the corolla lobes hairy on both sides, absence of hairs from the throat and glabrous anthers this species differs considerably from all others known from this region. It is a striking plant with its long loose paniculate inflorescences. The leaves resemble those of *S. malaccensis*, Benth., but the flowers are very different. Though it comes next to *S. bicirrhosa*, Lesch., in the key it may not be nearly allied to this Indian species of which the flowers are only in bud. Mature fruits are unknown for either plant but as regards flowers and leaves they have several characters in common.

In a note under *S. Tieuté*, King & Gamble (Mat. Flor. Mal. Penins. iv. p. 832) state that *King's Collector* 10311 agrees fairly well with the Javan species *S. Horsfieldiana*, Miq., which, however, is quite distinct in having a line of erect hairs across the corolla lobes (see p. 179). *S. hirsutiflora* is no doubt allied to *S. villosa*, A. W. Hill (see p. 143 and *K.B.* 1911, p. 296) which has been confused with *S. Horsfieldiana*.

10. **S. bicirrhosa,** *Lesch.* in Roxb. Fl. Ind. ii. p. 267, descr. ampl.

Frutex scandens, pubescens. *Folia* ovata, rotundato- vel elliptico-ovata, cuspidato-acuta, basi rotundata, 3·5-6 cm. longa, plus minusve 3 cm. lata, superne vernicosa, omnino et ad nervos praecipue minutissime pubescentia, triplinervia; cirrhi bifidi, atque rami pubescentes. *Inflorescentiae* paniculatae, pedunculi et pedicelli dense pubescentes. *Calycis* segmenta triangulari-ovata, acuta, 0·75 mm. longa, marginibus fimbriatis. *Corolla* externe hirsuta, alabastro 2·5 mm. longo, tubo 0·5 mm. longo glabro, lobis intus pilis laneis obtectis. *Antherae* ovatae, glabrae, 0·65 mm. longae, filamentis 0·65 mm. longis. *Ovarium* cum stylo 0·5 mm. longum, glabrum. *Fructus* immaturus (ex *Lesch.*) globosus, monospermus; G. Don. Dict. iv. p. 66; Grah. Cat. 1839, p. 112; A. DC. in DC. Prodr. ix. p. 16. *S. colubrina*, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 87; Benth. in Proc. Linn. Soc. i. p. 101; Watt, Dict. Econ. Prod. Ind. vi.

pt. iii. p. 378; Cooke Fl. Bombay, ii. p. 184; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 14 omnes quoad *S. bicirrhosa*, Lesch.

S. India. Koudracotta: about 20 m. south of Tanjore; in the forests, *M. Leschenault* (1820) *in herb. Wallich* 1589 (1).

S. bicirrhosa, Lesch., is a perfectly good and distinct species. It differs from *S. colubrina*, the species of the Malabar coast, in being covered with a minute pubescence both on stems and leaves; the triplinerved leaves, acute calyx segments, hairy corolla lobes and glabrous ovary and style also constitute important distinguishing features. Unfortunately the flowers of the single specimen are only in bud, and there is therefore uncertainty as to the ultimate size of the flowers and length of the corolla tube.

Wallich, no doubt by accident, has put down the locality on the sheet as "Nilghirries" but the spot where it was found is quite away from that region and no other specimens of *Strychnos* appear to have been collected there.

11. **S. vitiensis,** *A. W. Hill* in Kew Bull. 1911, p. 295; *S. colubrina*, Seeman, Flor. Vit. p. 166 non Linn.; descr. emend.

Corollae lobi intus glabri vel pilis paucissimis instructi.

Fiji Islands. Viti Levu, *Seeman* 302; *Milne* 64.

The leaves are markedly tripli- or almost quintupli-nerved and the nerves and reticulate veins are prominent on both surfaces. The lobes of the corolla are usually glabrous but a very few hairs are found occasionally on the inner surface.

12. **S. hypogyna,** *C. B. Clarke* in Hook. f. Flor. Brit. Ind. iv. p. 86; descr. ampl.

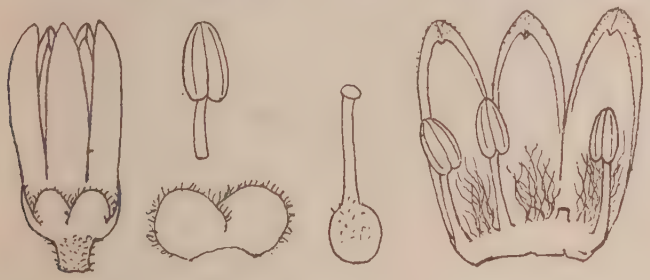
Folia triplinervia vel sub-triplinervia, acuminata, supra vernicosa. *Inflorescentia* paniculata, multiflora, 4-5 cm. longa, pedunculis rufo-pubescentibus, cymis ultimis 3-floris, pedicellis brevissimis. *Calycis* segmenta brevia, obtusa. *Corolla* 2-2·5 mm. longa, lobis intra laneo-tomentosis, tubo 0·4 mm. longo ad faucem tomentoso. *Antherae* 0·8 mm. longae, glabrae, filamentis 0·5 mm. longis. *Ovarium* superne pilis erectis instructum, cum stylo breve 1 mm. longum; Brandis, Indian Trees, p. 474.

Tenasserim. Mergui (?), *Herb. Griffith, K.D.* 3830.

In the Flora of British India the distribution of this species is extended to Borneo, and Clarke appears to have regarded a specimen collected by *Motley* (no. 902) as belonging to this species. This Bornean plant, however, has bearded anthers and is taken to be identical with *S. laurina*, Wall. (see p. 150).

13. **S. andamanensis,** *A. W. Hill;* species *S. hypogynae*, C. B. Clarke, affinis, floribus majoribus, calycibus extra glabris, stylo conspicuo praecipue differt.

Frutex scandens. *Folia* late-elliptica vel ovato-elliptica, basi rotundato-cuneata vel cuneata, apice acuminata, 11-14 cm. longa, 4·5-7 cm. lata, nervis 3-5, plus minusve triplinervia, superne vernicosa, glabra, nervis pagina inferiore sparse strigoso-hirsutis vel subglabris; petiolis circiter 5 mm. longis. *Inflorescentiae* axillares, paniculatae, 2·5-5 cm. longae, pedunculis parce rufo-pubescentibus, bracteis ovatis concavis acutis glabris, pedicellis circiter 2 mm. longis. *Calycis* segmenta 1 mm. longa, ovato-orbicularia, subacuta, glabra, marginibus fimbriatis.



Corolla 4·5-5 mm. longa, tubo 0·75-1 mm. longo, lobis ellipticis ligulatiformibus subacutis ad basin pilis longis laneis sparse instructis. *Antherae* 1 mm. longae, glabrae, filamentis 2·5 mm. longis. *Ovarium* cum stylo 5 mm. longum, glabrum vel subglabrum. *Fructus* globosus, glaber, circiter 1·8-2 cm. diametro, 1- (2?) spermus; pericarpium tenue, coriaceum. *Semina* orbicularia, plano-subconvexa, circiter 1 cm. diametro. *S. acuminata*, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 86, quoad spec. *Kurz* tantum; Kurz For. Flor. ii. p. 166 et Brandis, Indian Trees, p. 474, quoad spec. Andaman. tantum; Prain, Proc. Asiatic Soc. Bengal, 1891. p. 170, non Prain in Journ. Asiatic Soc. Bengal. lxii. pt. ii., 1893, p. 73. *S. laurina* (?), Kurz. Rep. Veg. Andam. Is. 1870, p. 43.

S. Andaman. Port Mouat, *Kurz;* Hobdaypore, *King's Collector; Prain's Collector; Heinig* 224, 410; Andamans, *Herb. R.E.P.* 12146.

Nicobar. *Jelinek* 159 (exped. Novara); Nicobar Island, *King's Collector* 521; Batti Malve, *Prain* (March, 1891).

This is a well marked species with its long ligulate perianth lobes and glabrous anthers borne on long filaments. The leaves are usually cuneate at the base, and the nerves on the under-surface are furnished with some brown strigose hairs.

Specimens have been collected in the Andamans, Nicobar Island and the Island of Batti Malve lying between the two groups. This latter plant is rather more hairy than the other specimens and bears no flowers, but should almost certainly be referred to this species.

A species of *Strynchnos* collected by Prain on the isolated island of Narcondam was referred by him to *S. acuminata*, Wall. It consists of leaves only, which are ovate-lanceolate gradually acuminate and trinerved. The young stems, petioles, and the

nerves on the under surface of the leaf are markedly rufous-tomentose. The plant appears to be a distinct species, and has been described under the name *S. narcondamensis* (see p. 203).

There is also a leaf specimen from the Nicobars collected by *Kurz* in 1875 (no. 26101), preserved at Kew which is unlike any other known species from these Islands or from the Andamans.

14. **S. panayensis,** *A. W. Hill*; species *S. ovatae*, A. W. Hill, affinis, foliis elliptico- vel ovato-lanceolatis triplinervibus venis inconspicuis, antheris majoribus conspicue barbatis praecipue differt.

Frutex glaber, cortice striato. *Folia* elliptico- vel ovato-lanceolata, 8-11 cm. longa, 2·5-5·5 cm. lata, acute acuminata, apiculata, basi rotundato-cuneata vel cuneata, glabra, superne vernicosa, venis inconspicuis, 5-nervia, triplinervia; petioli 0·5-1 cm. longi. *Inflorescentiae* axillares vel terminales, corymboso-paniculatae, 3 cm. longae, pedunculis pedicellisque

minutissime pubescentibus. *Calycis* segmenta 1 mm. longa, triangulari-ovata, acuta, marginibus ciliatis. *Corolla* 3·5 mm. longa, ad faucem pilis laneis instructa, lobis lanceolatis reflexis 2·5-2·65 mm. longis, glabris. *Antherae* 1·25 mm. longae, basi barbatae, filamentis 0·5 mm. longis. *Ovarium* conicum, cum stylo dense hirsutum 3-3·5 longum.

Philippine Islands. Panay; Capiz, *L. Escritor, Bur. Sci. No.* 21232—(Fl. June).

This is up to the present the only species of *Strychnos* known from the Island of Panay. The hairy flask-shaped ovary and bearded anthers distinguish it from other short-tubed species with triplinerved leaves. *S. panayensis* agrees with *S. ovata*, A. W. Hill, in the character of the anthers and ovary, but is easily distinguished by its leaves and larger, more densely bearded anthers.

Section ii. **Lanigerae.**

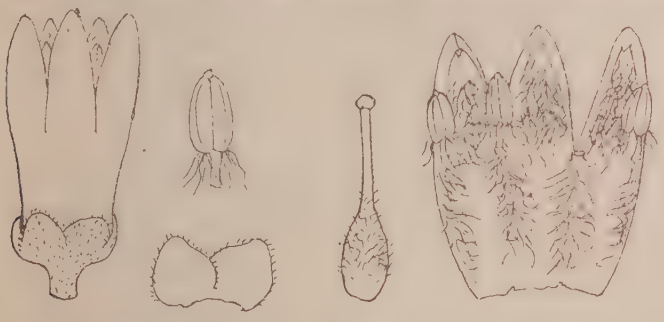
15. **S. cinnamophylla,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 166.

New Guinea. Kaiser-Wilhelmsland; woods near the Djamu-Klamm, 400 m., *Schlechter* 16793—(Fl. Nov).

The anthers are bearded at the base, and the ovary hairy. The throat hairs are very few and short. It may be nearly allied to *S. Forbesii*. A. W. Hill, but nothing definite can be said in the absence of fruits. The specimen has not been seen.

16. **S. septemnervis,** *C. B. Clarke* in Hook. f. Flor. Brit. Ind. iv. p. 88, descr. emend. et ampl.

Suffrutex scandens, caulibus 30 m. longis vel longioribus, 7-15 cm. in diametro, lenticellis ovalis instructis. *Folia* elliptica vel elliptico-ovata, basi attenuata, apice sensim acuta, coriacea, superne vernicosa, 5- vel obscure 7-nervia, triplinervia, 8-12 cm. longa, 4·5-6 cm. lata; petiolis 1 cm. longis. *Inflorescentiae* axillares, paniculatae, multiflorae, circiter 10 cm. longae; pedunculis pedicellisque pubescentibus. *Calyx* 1 mm. longus, segmentis rotundato-ovatis glabris marginibus ciliatis. *Corolla* 5 mm. longa, lobis 2·5 mm. longis pilis laneis plus minusve



transverse lineatim dispositis tuboque pilis laneis longitudinaliter dispositis dense instructis. *Antherae* oblongae, 1 mm. longae, basi plus minusve barbatae, filamentis 0·5-0·75 mm. longis hirsutis vel subglabris partibus tubo adnatis dense hirsutis. *Ovarium* cum stylo 4·5 mm. longum, pilis erectis instructum. *Bacca* immatura ovoidea, monosperma; pericarpium laeve, crustaceum; King & Gamble, Mat. Flor. Mal. Penins iv. p. 829 quoad spec. *Maingay* 1036. *S. Curtisii,* King & Gamble, Mat. Flor. Mal. Penins. iv. p. 824, partim.

Malay Peninsula. Perak: Ulu Bubong; jungle—clinging to large trees, 120-180 m., July, *King's Collector* 10281; 10438; without precise locality, *Maingay* 3031, 3051 (*K.D.* 1036).

Var. **imberbis,** *A. W. Hill,* foliis apice acuminatis, inflorescentiis minoribus pedunculis pedicellisque glabris vel minutissime pubescentibus, corollae tubo sparse hirsuto, antheris filamentisque glabris praecipue differt. *S. septemnervis,* King & Gamble, Mat. Flor. Mal. Penins. iv. p. 829, partim.

Malay Peninsula. Penang: Penara Bukit, Oct., *Curtis* 1021.

The corolla lobes near their base bear a dense tuft of long hairs arranged more or less in a transverse line. The throat is almost free from hairs, but the tube is densely hairy, usually in lines, which follow the adnate anther filaments.

The anthers are bearded at the base and the filaments are usually hairy. In the variety from Penang the corolla hairs are everywhere much fewer than in the species and the anthers are without beards.

The leaves both in the type and variety resemble those of *Cinnamomum* and with their relatively long petioles enable *S. septemnervis* to be easily recognised.

17. **S. Forbesii,** *A. W. Hill* in Kew Bull. 1909, p. 360; descr. emend. et ampl.

Folia ovato-elliptica, basi rotundato-caudata, apice acuta vel subacuta, 14-20 cm. longa, 6-7·5 cm. lata, tripli- vel subtriplinervia, superne vernicosa, glabra. *Inflorescentiae* axillares, paniculatae, 9-10 cm. longae, pedunculis glabris pedicellis glabris vel pauce pilosis. *Calycis* segmenta late ovata, subacuta vel obtusa, 1·25 mm. longa, marginibus exceptis glabra. *Corolla* 4 mm. longa, lobis 2·25 mm. longis reflexis parte superiore glabris ad faucem pilis laneis instructis, tubo glabro. *Antherae* ovoideae, 1-1·25 mm. longae, basi barbatae, filamentis 0·5 mm. longis in sinubus insertis. *Ovarium* cum stylo 3 mm. longum; stylus ad basin parce hirsutus. *Fructus* (spec. *H. O. Forbes* in herb. Mus. Brit. sine numero) 10 cm. diametro; pericarpium 8 mm. crassum; semina plurima, parva, subtrigona; A. W. Hill in Kew Bull. 1911, p. 295.

New Guinea. Sogeri Region; central position, *H. O. Forbes* 216, 230 in herb. Lugd. Bat., herb. Kew et herb. Mus. Brit.

An examination of the good specimens preserved at Leiden and the British Museum has necessitated some emendations of the original description. *S. Forbesii* appears to be closely allied to *S. barbata*, A. W. Hill. The flowers of *S. Forbesii* first examined were only in the bud stage and the character of the corolla hairs was in consequence not apparent. The hairs are woolly and form an irregular ring at the corolla throat and not a regular line as might be inferred from the description in *K.B.* 1909, p. 360.

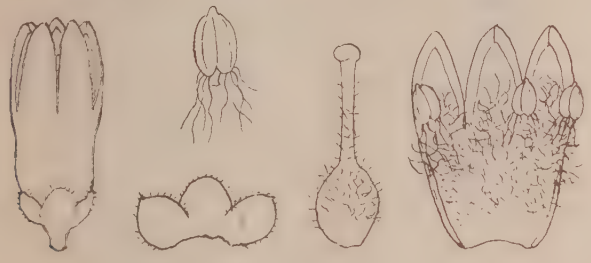
In *K.B.* 1911, p. 286, the species is wrongly placed in the key owing to the mistake as to the hairiness of the corolla. Its position is next to *S. barbata*, A. W. Hill, and from its flowers it appears to be related to *S. laurina*, Wall.

There are fruits preserved at the British Museum collected by Forbes in precisely the same region as his flowering specimens. Unfortunately they bear no number. They are remarkable for their size and thick pericarp, with relatively small seeds. If, as seems highly probable, they are the fruits of *S. Forbesii*, it is evident that it must be a very distinct species.

18. **S. laurina,** *Wall.* Cat. 1591; A. DC. in DC. Prod. ix. p. 13; descr. ampl.

Folia 10-16 cm. longa, 4-8·5 cm. lata, plus minusve triplinervia, lanceolata vel ovato-lanceolata, acuminata, basi cuneata vel rotundato-cuneata, glabra. *Inflorescentiae* axillares vel terminales, paniculatae, 10-15 cm. longae, multiflorae; pedunculis pedicellisque pubescentibus. *Calycis* segmenta orbicularia, 1 mm. longa, marginibus fimbriatis. *Corolla* circiter 5 mm. longa, lobis 2·25-2·5 mm. longis reflexis, versus basin et tubo ad faucem lano-hirsutis. *Antherae* 0·6-1 mm. longae, exsertae, basi paullo barbatae, filamentis 0·5-0·7 mm. longis in sinubus insertis. *Ovarium* cum stylo 3·5-3·75 mm. longum, pilis erectis dense hirsutum. *Bacca* immatura, ovoidea (*Helfer* 3724), circiter 2 cm. longa, monosperma (?); pericarpium membranaceum;

Griffith, Notulae, iv. p. 83; Benth. in Journ. Linn. Soc. i. p. 102; Kurz. For. Flor. ii. p. 166; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 88, syn. *S. ovalifolia*, Wall. et fruct. descr. excl.; King & Gamble, Mat. Flor. Mal. Penins. iv. p. 825 dubie fruct. descr., *Maingay K.D.* 1035 et *Ridley* 2161 (?) excl.;



Brandis, Indian Trees, p. 475; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 16 et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 166, spec. Indo-Chin. excl.; A. W. Hill in Kew Bull. 1911, p. 297. *S. acuminata*, Wall. Cat. 1593 no. 1; A. DC. in DC. Prodr. ix. p. 14 partim, quoad 'Amherst' spec. tantum et var. excl.; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 86 quoad *Wallich* 1593, no. 1 et *Helfer* tantum; Kurz in For. Flor. ii. p. 166 et Brandis, 'Indian Trees' p. 474 quoad spec. Tenasserim tantum. *S. colubrina*, Wall. Cat. 4455 (*Koenig*) partim sub *S. Beddomei*, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 88.

Burma. Tenasserim: Tavoy, *W. Gomez in Herb. Wallich* 1591; Thanna Hill, *Shaik Mokim* 336; *Amherst* (11. 2. 1827), *Wallich* 1593 no. 1; Mergui, *Griffith* 191 *K.D.* 3729); Mergui (?), *Griffith*, *K.D.* 3727; Mergui Island, *Helfer*, *K.D.* 3727; Domel Is., *Helfer*, *K.D.* 3727; without precise locality (fruiting spec.) *Helfer*, *K.D.* 3724, 3728; without precise locality *Koenig** 4455 in herb. Wallich partim.

Malay Archipelago. Borneo: Bangarmassing, *Motley* 902 (?). There are also specimens, both at Kew and Leiden, from plants cultivated at Buitenzorg, collected by Teijsman, which apparently should be referred to *S. laurina*.

Var. **Thorelii**, *A. W. Hill; Folia* anguste ovato-lanceolata, glabra, basi et apice cuneata 7·5-10 cm. longa, 3·5 cm. lata, trinervia. *Inflorescentiae* paniculatae, 3-4 cm. longae, pubescentes. *Calycis* segmenta rotundata, marginibus fimbriatis. *Corolla* 4 mm. longa vel longior (?) ad faucem et tubo parte superiore pilis laneis dense instructa, lobis glabris acutis 2·5 mm. longis. *Antherae* 1·5 mm. longae, basi dense et longe barbatae. *Ovarium* inferne glabrum; stylus 2 mm. longus cum ovario ad apicem dense hirsutus. *S. laurina*. Dop in Bull. Soc. Bot. Fr.

* Koenig went to Malacca and Siam in August, 1778, and returned to India in 1779 (see Lasègue Mus. Bot. Delessert, p. 557); it is probable that his specimen of *S. laurina* came from near Bat-buri on the Siamese border of Tenasserim.

lvii. Mém. 19 (1910), p. 16 et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 166, quoad spec. Cochchin.

Cochin-China. Bienhoa: *Thorel* 1064; Ti-tinh, *Pierre*, 6303 in herb. Mus., Paris.

The Cochin-China specimens collected by Thorel and Pierre are no doubt nearly allied to *S. laurina*, Wall., but differ in the leaves, the larger and more hairy anthers, and in the ovary being glabrous, except at the apex.

S. ovalifolia, Wall., included by Clarke under *S. laurina*, is a distinct species belonging to the long-tubed section of the genus (see p. 201). Under *S. laurina*, Clarke, and also King and Gamble, include Maingay's Malacca specimen no. 3393 (*K.D.* 1035). Unfortunately there are no flowers, but the lenticels on the stems, the trinerved leaves with long acuminate tips and the fruits agree with those of *S. Mainguyi*, Clarke, and the specimen has been placed under that species. The other plant placed by them under *S. laurina* is *Ridley* 2161 from Pahang; the flowers are only in bud and resemble those of *S. laurina*, but the leaves do not quite agree.* Another doubtful specimen is that collected by *R. L. Keenan*, at Shapore, Cachar; the specimen bears buds only and no hairs can be detected on the flowers.

Whether *S. laurina* ranges into Indo-China, as Dop states, is uncertain in the absence of complete specimens, but from that region the plants appear to be very near to the type and are therefore considered as a variety.

Helfer 3728 is placed by Clarke (l.c.) under *S. acuminata*, and by Dop under *S. laurina*. It is undoubtedly *S. laurina* with the flowers in bud only, and was collected not in the Andamans but in Tenasserim.

S. acuminata, Wall. Cat. 1593 in part (collected at Amherst), is a leaf specimen only (see A. DC. in DC. Prod. ix. p. 14, excluding specimen *b* and the variety) but should no doubt be referred to *S. laurina*.† Bentham (Journ. Linn. Soc. i. p. 103), suggests that *S. acuminata* should be referred to *S. ovalifolia*, Wall.

Reference has already been made to the Wallichian sheet 4455 b. (see pp. 151 & 158) referred to by Clarke under *S. Bed-*

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* The specimens referred to by King & Gamble, l.c. p. 826, in the footnote to *S. laurina* have been described as a new species *S. quadrangularis* (see p. 205).

† With regard to the two other Wallichian specimens bearing the number 1593, considerable confusion has arisen owing to the labelling of No. 2 with the letter *a* and No. 3 with the letter *b* on the Wallichian sheet. C. B. Clarke has assigned both Nos. 1 and 3 *b* (= var. *c.* of A. DC. from Atran) to *S. acuminata*, but No. 2 *a* he has referred to *S. rufa*, var. *Candollei*, and being perhaps mislead by the subsequent lettering of Wallich's specimens, has made De Candolle's *S. acuminata*, a synonym of this variety.

Of these three Wallichian specimens, No. 1 only belongs to *S. laurina*. No. 2, which consists of three pubescent leaves and a piece of stem, may be related to *S. rufa*, C. B. Clarke. No. 3, also a leaf specimen, with large, coarsely-veined leaves is *S. Nux-blanda*, A. W. Hill (see p. 189).

domei. The upper flowering specimen undoubtedly belongs to *S. laurina*, but the lower one is *S. colubrina* from S.W. India.

Like some other Malayan plants, *S. laurina* may also occur in Borneo, if the somewhat imperfect specimen *Motley* 902 is rightly assigned to this species.* The flowers, however, are in bud and the specimen cannot be determined with any certainty.

The Javan specimens appear to be all taken from cultivated plants, and we have no evidence that *S. laurina* is indigenous in the island. Brandis (Indian Trees, p. 475), extends the distribution to the Nicobars, but if he had in mind *Kurz* 26101, an immature specimen, he is certainly incorrect. Such a distribution also is not very probable.

The description of the fruit given by Clarke (Flor. Brit. Ind. iv. p. 88), is based on *Maingay K.D.* 1035 from Malacca, which proves to be *S. Maingayi*, Clarke. The description, and that given by King & Gamble l.c., which is also taken from the same specimen, must therefore be disregarded.

The only fruiting specimen of *S. laurina* at Kew or Calcutta is *Helfer* 3724, and Kurz's description—"berries oval, about an inch long, with a membranous skin, containing a single large seed conform with the berry"—is no doubt based on this specimen (For. Flor. ii. p. 166). The fruits however are not fully mature and their structure cannot properly be determined.

19. **S. similis,** *A. W. Hill* in Kew Bull. 1912, p. 38; descr. emend.; species *S. laurinae*, Wall. et *S. barbatae*, A. W. Hill, affinis, sed ab ambabus antheris fusco-viridibus, foliis anguste elliptico-lanceolatis praecipue differt.

Folia conspicue triplinervia vel quintuplinervia. *Corolla* 5·5 mm. longa, lobis 2·75 mm. longis inferne et corollae fauce hirsutis. *Antherae* 1 mm. longae, fusco-virides, basi barbatae; filamentis 0·75 mm. longis. *Ovarium* globosum, 1 mm. diametro, hirsutum; stylus 3·5 mm. longus, basi hirsutus.

Philippine Islands. Mindanao: Prov. Surigao; Hinatuan, *C. V. Piper*, 504.

In the original description the size of the anthers was omitted and by a misprint the diameter of the ovary was given as 8 mm. instead of 1 mm. The paniculate inflorescences are some 8-10 cm. long and 7 cm. in breadth. *S. similis* was compared with *S. multiflora* and *S. lanata*, but in its triplinerved leaves, bearded anthers and hairy ovary it resembles *S. barbata*, A. W. Hill, and *S. Forbesii*, A. W. Hill, from New Guinea, and also *S. laurina*, Wall., from Burma and Malaya. The leaves are 5-nerved, the intermediate pair branching off from the mid-rib some 1·5-2 cm. above the base of the leaf.

20. **S. barbata,** *A. W. Hill* in Kew Bull. 1909, p. 359; Kew Bull. 1911, 297. *Sirioides*, Rumph. Herb. Amb. v. p. 50 (?)

New Guinea. Soron: Olandite, *Beccari* 98.

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* This specimen appears to be referred to in Hook. f. Flor. Brit. Ind. iv. p. 86, under *S. hypogyna*, C. B. Clarke.

Amboina. Amahoesoe: on cliffs 6 m. alt. *C. B. Robinson* 2028.

According to E. D. Merrill, from whom the Amboina specimen was received, this species probably represents Rumphius' *Sirioides* which has not previously been identified.

The broadly elliptical leaves in the Amboina plant measure as much as 16 cm. long by 9·5 cm. broad. They are conspicuously triplinerved, and there are five well-marked veins. The corolla measures 6 mm., the tube being equal in length to the lobes. The anthers are 1-1·25 mm. long, and the filaments, which measure 1·75-2 mm. in length, carry the anthers to the top of the corolla lobes. In the New Guinea specimen the length of the corolla is only about 4·5 mm., but there seems very little doubt that both specimens should be referred to *S. barbata*.

21. **S. potatorum,** *Linn. f.* Suppl. p. 148; descr. ampl.

Inflorescentiae axillares, pedunculis pedicellisque glabris *Calyx* glaber. *Corolla* 6·5-7 mm. longa, lobis 3-3·5 mm. longis fauceque pilis sparsis instructis. *Antherae* 1 mm. longae, glabrae filamentis 1·5-1·75 mm. longis in sinubus insertis. *Ovarium* cum stylo glabrum, 6 mm. longum; G. Don, Dict. iv. p. 65; A. DC. in DC. Prodr. ix. p. 15 (lit. cit.); Wight, illustr. ii. t. 156; Benth. in Journ. Linn. Soc. i. 103; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 90 (lit. cit.); Kurz, For. Flor. ii. p. 167; Cooke, Fl. Bombay, ii. p. 186; Dalz. & Gibs. Bombay Flora, p. 156; Wall. Fl. Ind. ii. p. 263; Roxb. Fl. Ind. i. p. 576; Thwaites, Enum. Plant. Zeylan. p. 425 non p. 201; Trimen, Fl. Ceylon, Pt. iii. p. 176; Brandis, Indian Trees, p. 474; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 18; Bourdillon, Forest Trees, Travancore, p. 270.

Ceylon. Doonbera; Trincomalee, *Glenie C. P.* 3719; without locality, *Koenig* in herb. Mus. Brit.

S. India. Deccan peninsula: Mysore to Chotanagpur; numerous collectors.

Burma. Prome Hills, *Wallich* 1585; Pegu, Prome, *Kurz* 2320; Prome, *Burkill* 23819 in herb. R. E. P.

The inflorescences are borne at the end of short, leafy, axillary shoots. The long flowers resemble externally those of the long-tubed species, but the corolla lobes are almost equal in length to the tube. The mature leaves are quintuplinerved and easily recognized from those of any other eastern species. Some specimens from Courtallum in herb. Wight (1836 no. 639) at Glasgow have obovate leaves cuneate at the base, and the twigs are unusually slender. The tree is characteristic of the dry regions of India and Ceylon and the only record of its occurrence in Burma is from the Prome Hills, where conditions resemble those of the drier parts of India. As the tree bears no native Burmese name it seems possible that it may have been introduced from India.

The Burma material is very poor, no flowers being present, but

the seed appears to be rather larger than in the Indian specimens. Kurz's description also differs slightly from that given in the Flora of British India.

22. **S. flavescens,** *King & Gamble* in Mat. Flor. Malay Penins. iv. p. 827; descr. ampl.

Folia trinervia. *Calycis* segmenta orbicularia-ovata, rotundata, ciliata. *Corolla* externe minute hirsuta, 2·5 mm. longa, lobis 1 mm. longis elliptico-ovatis acutis intus et ad faucem dense laneo-hirsutis. *Antherae* 0·5 mm. longae, glabrae vel subglabrae inter pileos occultae, filamentis 0·5 mm. longis. *Ovarium* globosum, glabrum; stylus 0·65 mm. longus, pilis erectis instructus. *Fructus* ovoideus, 1·8 cm. longus, monospermus; pericarpium tenue. *Semen* 1·6 cm. longum, planum.

Malay Peninsula. Perak: Larut; rocky local open jungle, 150-250 m. (Oct.), *King's Collector* 4998 in herb. Calc.; *Scortechini* 1498. Penang: Waterfall, *Curtis* 3430; Waterfall (Sept. 1901, fruit) *Curtis*. Malacca: Ayer Panas, *Curtis* 3490.

Other specimens are quoted by King and Gamble, but those mentioned are the only representatives at Kew. *Curtis* 3430 is a fruiting specimen, and the description of the fruit is fully given in the 'Materials' but the hairiness of the style is not mentioned. The specimen from Perak is described as a shrubby creeper 30-40 ft. long, with leaves of a light yellowish-green colour; this leaf colour is very noticeable in all the dried specimens.

23. **S. coriacea,** *Thwaites,* Enum. Plant. Zeyl. p. 425; descr. ampl.

Frutex ramulis junioribus pubescentibus. *Folia* ovato- vel elliptico-lanceolata, acuta vel breviter acuminata, coriacea, 6-6·5 cm. longa, circiter 3 cm. lata, marginibus paullo reflexis, subtriplinervia, nervibus crassis, petiolis 2 mm. longis hirsutis. *Inflorescentiae* axillares, crassae, 3·5-4 cm. longae, pedunculis pedicellisque pubescentibus. *Calyx* 1·5 mm. longus; segmenta late ovata, subacuta, marginibus ciliatis. *Corolla* 6 mm. longa, externe puberula, lobis 3 mm. longis interne totius cum corolla ad faucem dense lano-tomentosis, pilis longis intertextis, tubo glabro. *Antherae* 1·25 mm. longae, ellipticae, glabrae, filamentis crassis 1·5 mm. longis. *Ovarium* cum stylo 4·5 mm. longum, pilis erectis instructum. *S. Beddomei,* var. *coriacea,* C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 89; Trimen, Fl. Ceylon, pt. iii. p. 173. *S. potatorum,* Thwaites, Enum. p. 201 partim.

Ceylon. Central Province, *Thwaites* 3367.

In its pubescent stems and petioles, leathery, shortly petioled, subtriplinerved leaves, puberulous corolla with lobes densely hairy from base to apex, this plant appears to be worthy of specific rank. I have therefore followed Thwaites and also prepared a more ample description. According to Trimen its habitat is the Central Province of the island, which suggests that it is

a truly endemic species. It is unfortunate that it is represented at Kew and the British Museum by only single specimens and that no fruits have been collected.

24. **S. polytricantha,** *Gilg* in Notizbl. der Kgl. Bot. Gart. Berlin, 1897, no. 8. p. 267; A. W. Hill in Kew Bull. 1911, p. 298, with text figs.

Malay Archipelago. Borneo; Sarawak, *Beccari* 2275, 1190.

The corolla, which is 1 cm. long, is densely hairy within, both tube and lobes being covered with long woolly hairs. The corolla lobes slightly exceed the tube in length. The anthers are glabrous, 1·5 mm. long, and are borne on long filaments 2·5 mm. in length. The ovary and style are densely hairy. The fruit is large and woody but the only specimen is immature.

25. **S. dubia,** *A. W. Hill* in Kew Bull. 1911. p. 298, et figs.

Philippine Islands. Mindanao: Davao dist.; Todaya, *Elmer* 10958.

The leaves are trinerved, and the nerves on the lower surface bear scattered strigose appressed hairs—this character was overlooked in the original description. The anthers are glabrous, more or less orbicular, and are borne on relatively long filaments. In these particulars especially it differs from *S. multiflora*.

26. **S. oleifolia,** *A. W. Hill;* species *S. dubiae*, A. W. Hill, similis, foliis elliptico-lanceolatis nervis marginibus subparallelis, corolla antherisque majoribus, ovario conico cum stylo hirsuto differt.

Frutex scandens, 15-20 m. altus, ramis striatis glabris. *Folia* elongato-elliptico-lanceolata, glabra, 8-13 cm. longa, 3·5-4·2 cm. lata, acuminata, 3-5-nervia, basi rotundato-cuneata, 5-nervia, tri- vel subtriplinervia, jugo infimo tenue sub margine percurrente sensim evanescente, jugo superiore margini subparallelo et ab eo circa 6-8 mm. percurrente. *Inflorescentiae* axillares, densi- et multiflorae, 10 cm. longae vel ultra, paniculatae; pedicellis minutissime pubescentibus. *Calycis* segmenta orbiculari-ovata, subacuta, glabra, 1·5 mm. longa, marginibus ciliatis. *Corolla* circiter 8 mm. longa, tubo extra sparse hirsuto, lobis 4-4·5 mm. longis intus parte inferiore et tubo dense laneo-hirsutis. *Antherae* glabrae, 1·25 mm. longae, filamentis 2·5 mm. longis. *Ovarium* conicum, cum stylo 6 mm. longum, hirsutum.

Philippine Islands. Palawan: Taytay; forest slopes, common, 10-100 m., *E. D. Merrill, Bur. Sc. No.* 9364.

27. **S. micrantha,** *Thwaites*, Enum. Plant. Zeyl. p. 425 partim, *C.P.* 1866 excl.; C. B. Clarke in Hook. f. Fl. Brit. Ind. iv. p. 86 partim sed ovarium hirsutum nec glabrum; Trimen, Fl. Ceylon, pt. iii. p. 172, partim, *C.P.* 1866 excl.; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 14, var. excl. *S. colubrina* et *S. Beddomei*, Brandis, Indian Trees, p. 474

partim quoad spec. Zeylan. tantum. *S. laurina*, Thwaites, Enum. p. 201. *S. Beddomei*, Trimen, Fl. Ceylon, pt. iii. p. 173, var. excl.

Ceylon. Trincomalee & Central Province, up to 600 m., *Thwaites C.P.* 3720 (3720 A in herb. Kew); *Thwaites* 3540.

The corolla is about 4 mm. long the lobes and tube being equal in length. The lobes in the lower part and the throat bear scattered woolly hairs. The ovary is hairy as described by Thwaites.

S. micrantha is very closely allied to *S. colubrina* from the western side of the Indian Peninsula, and its flowers especially resemble those of the specimens from Travancore. The usually narrowly-elliptic, lanceolate, acuminate leaves, and the corolla with lobes equal in length to the tube serve as a means of recognising the Ceylon specimens. *S. micrantha* may be regarded as the Ceylon representative of *S. colubrina* and both no doubt must be reckoned among the plants long known as '*lignum colubrinum*.'

It is very unfortunate that *S. micrantha* is not represented by fruits in our herbaria. The fruiting specimens assigned to it have been found to belong to *S. lenticellata*, A. W. Hill. On the sheets of *Thwaites* 3720 and 3540 at Kew, portions of fruiting specimens have been attached which are identical with *Thwaites* 1866 excluded by me from *S. micrantha*. These and no. 1866 agree so closely with *S. lenticellata*, from S.E. India that they have been referred to that species. Specimens in the Wallichian herbarium under the label "Ceylon 96 & Palamcottah 95" collected by *Rottler* in 1795 & 1796 have also been referred to *S. lenticellata*.

28. **S. colubrina,** *Linn.* Sp. Pl. p. 271; descr. emend.

Folia ovato-elliptica, elliptica vel elliptico-lanceolata, 8-12 cm. longa, 4-5·5 cm. lata, acuta vel acuminata, basi rotundato-cuneata vel cuneata, trinervia vel subtriplinervia, superne verrucosa, glabra, cirrhis bijugis, petiolis circiter 1 cm. longis. *Inflorescentiae* axillares, circiter 2·5 cm. longae, pedunculis pedicellisque pubescentibus. *Calycis* segmenta orbiculari-ovata, pubescentia, marginibus ciliatis, 1 mm. longa. *Corolla* externe glabra vel subglabra, 3·5-4 mm. longa, lobis 2-2·5 mm. longis repandis parte inferiore et ad faucem pilis laneis instructis. *Antherae* ovoideae, 0·75 mm. longae, glabrae; filamentis 0·75-1 mm. longis. *Ovarium* cum stylo 2·5-3 mm. longum, ad apicem et cum stylo pilis erectis instructum. *Fructus* globosus, glaber, circiter 1·5 cm. diametro; pericarpium crustaceum. *Semina* 1-3 (fide *Rheede*), 1·25 cm. diametro, discoidea; Linn. Amoen. (1751) ii. p. 119; Linn. Mat. Med. p. 27 partim; Linn. Suppl. p. 149; Burm. Fl. Ind. p. 58 partim; Willd. Sp. Pl. i. p. 1502, syn. Burm. Fl. Ind. p. 58 partim et Rumph. Amb. ii. cap. xlvi. excl.; Benth. in Journ. Linn. Soc. i. p. 101 spec. Wall. 1589 A. & B., 4455 B partim et syn. excl.; Dalz. et Gibs. Bombay Fl. p. 155 dubie, syn. et cit. excl.; C.B. Clarke in Hook. f. Fl. Brit. Ind. iv. p. 87, et Cooke Fl. Bombay, p. 184, syn. *S. bicirrhosa*, Lesch. et var.

zeylanica excl.; Brandis, Indian Trees, p. 474 partim; Watt Dict. Econ. Prod. Ind. vi. pt. iii. p. 378 syn. *S. bicirrhosa*, Lesch. excl.; non Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, (1910), p. 14;* *S. minor*, Blume in Rumphia, i. p. 70 partim; A. DC. in DC. Prod. ix. p. 14 quoad syn. Rheede Hort. Malab. vii. t. 5; Miq. Flor. Ned. Ind. p. 379. *Scheru-Katu-valli-Caniram*, Rheede, Hort. Malab. vii. p. 9. t. 5.

S. Beddomei, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 88 spec. zeylan. et var. *coriacea* excl.; non Trimen Fl. Ceylon Pt. iii. p. 173.

Specimina excludenda:—

S. colubrina, Bl. in Rumph. l. p. 70, *S. colubrina*, Roxb. Fl. Ind. ii. p. 264 et Roxb. Fl. Ind. i. p. 577 (= *S. cinnamomifolia* var. *Wightii*, A. W. Hill, v. p. 194) etiam G. Don Dict. iv. p. 65 (cf. obs. sub. *S. cinnamomifolia*).†

S. colubrina, Burm. Fl. Ind. p. 58 quoad Rumph. Amb. ii. cap. xlvi. p. 121-122 (= *S. ligustrina*, Bl.) et quoad syn. *Modira caniram*, Rheed. Hort. Malab. viii. p. 47 t. 24 (= *S. Rheedii*, C. B. Clarke, v. p. 208), nec A. DC. in DC. Prod. ix. p. 14, nec Thwaites, Enum. Pl. Zeylan. p. 201 (= *S. micrantha*, Thw.), nec *S. Beddomei*, Trimen, Pl. Ceylon, pt. iii. p. 173 (= *S. micrantha*, Thw.).

S. India. Between Cochin and Poaha and Baypyn island, *Rheede, Hort. Malab.* vii. t. 5; Malabar, *Herb. Wight, K.D.* 1816; *Wallich* 1589‡ *Herb. Wight in Herb. Wall.; Wallich* 1589 C. in Herb. Kew.; Cochin, *Rev. E. Johnson;* Bombay, *Dalzell Herb.;* Concan, *Law* (Herb. Hook.); Bombay *Law* (Herb. Benth.); Malabar, *Beddome* 42; Travancore, foot of Ghats, *Beddome* 50; Canara, *Law;* Mangalore, *Meebold* 9587; N. Canara Dist., Santgal, *Talbot* 3703; Poona, *King's Collector; Wallich* 4455 Herb. Madras "inter plantas ab Koenigio lecta" as to fruiting specimen only§; Quilon, *Herb. Wight* 2289; without locality *Herb. Wight*, 567, 641.

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* The specimen from Coimbatore, quoted by Dop, under *S. colubrina*, proves to be *S. lenticellata*, A. W. Hill.

† It is not easy to be certain whether *S. colubrina* of Blume, Roxburgh and Don, should be referred to *S. Rheedii*, Clarke, *S. aenea*, A. W. Hill, or to *S. cinnamomifolia* var. *Wightii*, A. W. Hill. From Roxburgh's description, however, it seems clear that the corolla has a cylindric tube and the seed coat is said to be velvety; Blume adds that the leaves are triplinerved. On these points, therefore, *S. colubrina* of Blume and Roxburgh (partly also of G. Don) is referred to *S. cinnamomifolia* var. *Wightii*; and *Modira caniram* of Rheede, which, according to the picture, has a very short corolla tube, is left as the type of *S. Rheedii*, C. B. Clarke.

‡ The other Wallichian plants under the No. 1589 are No. 1589D which is *Celtis Wightii* (see Benth. in Journ. Linn. Soc. i. p. 101); No. 1589 (i) herb. Lesch. = *S. bicirrhosa*, Lesch.; No. 1589 (2) herb. Heyn = *S. lenticellata*, A. W. Hill. No. 4455 herb. Heyn in herb. Wallich proves to be *S. Nux-vomica* (see Benth. l.c.).

§ Wallich's No. 4455 Herb. Madras "inter plantas ab Koenigio lecta" has been referred to *S. Beddomei* by C. B. Clarke (see Flor. Brit. Ind. iv. p. 88). There are two specimens on the sheet, the upper bearing flowers proves to be *S. laurina*, Wall., the anthers being bearded at the base, &c., and was no doubt collected by Koenig when he went to Malacca and Siam in 1778–79 (see Lasègue, Mus. Bot. Delessert, p. 557). The lower fruiting specimen represents *S. colubrina*.

Linnaeus founded his species *S. colubrina* on Rheede's picture in the Hortus Malabaricus, vol. vii. p. 9. t. 5, and there is no corresponding specimen in the Linnean Herbarium. The Wallichian specimen 1589 *herb. Wight* is, however, without doubt the same thing as the plant figured by Rheede. The first confusion was introduced by Willdenow, who adds references to Burm. Fl. Ind. in which Hort. Malab. viii. p. 47, t. 24, is cited (this is the type of *Strychnos Rheedii*, C. B. Clarke), and also to Rumph. Amb. ii. p. 121, which is the Timor plant (*S. ligustrina*, Bl.). At the end, however, he adds that *S. colubrina* is a native of India!

Roxburgh augments the confusion by quoting from Willdenow not only the wrong figure in Rheede, but also by giving a description of his conception of Linnaeus' *S. colubrina*, and including Smith's plant from Silhet as a specimen. This particular specimen is *S. axillaris*, Colebr., and belongs to a different section of the genus. De Candolle only continued the confusion as did also Bentham, who added to it by including *S. bicirrhosa*, Lesch. as a synonym of *S. colubrina*. To C. B. Clarke in the Flor. Brit. Ind. iv. p. 87, is due the credit of establishing clearly what Linnaeus intended as his *S. colubrina*, but unfortunately in his synonymy he included *S. bicirrhosa*, Lesch., following Bentham, and also established a variety *zeylanica* from Ceylon. This latter proves to be quite a distict species, and is described herein under the name *S. trichocalyx*, A. W. Hill (see p. 174), belonging to the *Penicillatae* section of the genus. It is the plant which Bentham places under *S. minor*, Bl. as var. *nitida* and unfortunately suggests that it may be the plant figured by Rheede in Hort. Malab. vii. t. 5.

Dop adds to this confusion by citing under *S. micrantha* a Pierre specimen from Ceylon and another from Cochin, both with glabrous ovaries. On inspection of the specimens at Paris it was found that the Indian plant represents *S. Dalzellii*, C. B. Clarke, while the Ceylon plant is *S. trichocalyx*. Dop placed them under *S. micrantha*, following Clarke in his mistaken statement that the ovary in that species is glabrous, whereas Thwaites states that it is villous (Enum. p. 425), which is confirmed by our own observation.

With regard to *S. Beddomei*, Clarke, no essential differences have been found to separate it from *S. colubrina*, Linn. and it has therefore been reduced. Clarke compares it to *S. laurina* from Malaya, and on Wallich's sheet 4455 (*Koenig*) the two species are mixed. *S. laurina*, however, differs in the leaves and in having bearded anthers, and a much larger panicle of flowers.

In the Hortus Malabaricus Rheede's picture of the small fruit shows three seeds in section, and in his description he says "*Semina* minime." *S. colubrina* is one of the four plants referred to by Rheede under the name 'Caniram' and is one of two known as 'Valli-Caniram' (see Rheede l.c. i. p. 67).

29. **S. lenticellata,** *A. W. Hill;* species ex affinitate *S. colubrinae*, Linn., et *S. micranthae*, Thw., sed ramis lenticellis con-

spicue instructis, foliis triplinerviis minoribus, segmentis calycis angustioribus, antheris orbicularibus distincta.

Frutex scandens, ramis et ramulis striatis lenticellis insigniter instructis, cirrhis bijugis glabris. *Folia* obovata vel ellipticoobovata, basi et versus apicem cuneata, acuta vel subacuta, mucronulata, aliquando retusa, 5-7 cm. longa, 2 cm. lata, glabra, superne vernicosa, triplinervia, venis nervisque prominentibus; petioli 5 mm. longi, e basi tumido orti. *Inflorescentiae* axillares, multiflorae, circiter 3 cm. longae; pedunculis et pedicellis pubescentibus. *Calyx* 1·25-1·5 mm. longus, segmentis anguste ovatis vel ellipticis subacutis subglabris vel pubescentibus marginibus hirsutis. *Corolla* 3·5-4 mm. longa, lobis repandis 2-2·5 mm.

longis ovato-lanceolatis subacutis parti inferiore pilis laneis sparsis instructis tubo glabro. *Antherae* orbiculares, 0.65 mm. diametro, filamentis 1-1·25 mm. longis. *Ovarium* cum stylo 3 mm. longum, hirsutum, ovario apice praecipue pilis erectis instructo. *Fructus* globosus, circiter 2 cm. diametro, 1-2-spermus; pericarpium crustaceum. *Semen* orbiculare, 1·4 cm. diametro, planum, circiter 2 mm. crassum, glabrum. *S. potatorum*, Thwaites, Enum. p. 201 quoad *C.P.* 1866. *S. micrantha*, Thwaites, Enum. p. 425 et Trimen. Flor. Ceylon, pt. iii. p. 172 quoad *C.P.* 1866.

Vern. Name. Cheroomolaghoo, according to a label on a specimen, dated 1828, in herb. Wight preserved in the University Herbarium, Glasgow.

S. India. Madras: Cuddapah Hill (7/81), *Beddome* 6, 5305 in herb. Mus. Brit.; Madras, without precise locality, *Wight & Heyn* (*Wallich* 1589 b. in herb. Heyn); Negapatam, *Herb. Wight;* Kurnool Hills *Beddome* (1878); Palamcottah (1795), *Rottler* 30 *Wallich* 1585 b. (herb. Klein?) in herb. Wall.; Chingleput Dist.; Kambakkam Droog, *Bourne* 2533; Kambakkam Hills (May 1913, fruit), *Barber* 8862 in Coimbatore Coll. herb.; Kouri Kandjera, *Leschenault* in herb. Mus. Paris.

Ceylon. *Rottler* 1796; *Wallich* 1585 b. in herb. Wall.; without precise locality, *Thwaites* 1866; also fruiting specimens attached to sheets of *Thwaites* 3720, 3540 in herb. Kew; fruits (labelled "near *axillaris*") Colombo, *Ferguson* in Mus. Kew.

A very distinct species with its stems closely covered by conspicuous lenticels. The triplinerved leaves are relatively small and uniform in size, tapering regularly towards base and apex. In the flowers the orbicular anthers afford a useful character for distinguishing the species and the calyx segments are much narrower than is common in allied species.

Wight on his label when sending the plant to Sir W. Hooker under the name *S. colubrina* (?) suggests that it is a new species, since Willdenow in contradiction to Indian botanists said it was not *S. Nux-vomica*. Specimens collected by Rottler at Palamcottah in 1795 and Ceylon 1796 and placed by Wallich under his number 1585 with *S. potatorum* also belong to this species.

Some references to the Ceylon specimens will be found in the note under *S. micrantha*, Thw. (see p. 157): There is a bottle of ripe fruits with two leaves in fluid in the Kew Museum bearing the label "*Strychnos* near *axillaris*, Colombo, W. Ferguson," which apparently belong to *S. lenticellata*. They are about 2 cm. in diameter, 2-seeded with a fleshy pericarp 5 mm. thick.

It is unfortunate that Thwaites gave no exact localities with his specimens. Trimen under *S. micrantha* (with which *S. lenticellata* is included), gives 'Low Country' as the habitat, and mentions Peradeniya, Galle and Trincomalee as localities. Whether these all refer to *Thwaites* 1866 as well as to the true *S. micrantha* is uncertain.

Judging from the localities in which the Indian specimens have been collected, *S. lenticellata* is a dry country plant, and it would be likely to occur in similar situations in Ceylon, and therefore in the northern drier portion of the island which is in all essentials a part of India.

30. **S. Merrillii,** *A. W. Hill* in Kew Bull. 1911. p. 297; descr. emend; species *S. multiflorae*, Benth., affinis, foliis floribusque minoribus ramis parce pubescentibus praecipue differt.

Frutex scandens, ramis parce et minutissime pubescentibus. *Folia* elliptico-ovata, plus minusve abrupte et longe acuta vel acuminata, basi rotundato-cuneata, 6-8·5 cm. longa, 3-3·5 cm. lata, 5-nervia, triplinervia, superne glabra, venis reticulationibus conspicuis inferne nervis praecipue parce pubescentibus pilis adpressis vel glabris, petiolis circiter 1 cm. longis parcissime pubescentibus. *Inflorescentiae* axillares et terminales, 7-9 cm. longae, laxe paniculatae, tenues; pedunculis pedicellisque minutissime et dense pubescentibus. *Calycis* segmenta orbicularia, 1 mm. longa, obtusa, marginibus minutissime ciliatis. *Corolla* 5-5·5 mm. longa, lobis tubo aequilongis elliptico-lanceolatis acutis externe minute pubescentibus interne parte superiore glabris inferiore et cum tubo dense laneo-hirsutis. *Antherae* glabrae, 0·75-0·9 mm. longae, ellipticae, apiculatae, filamentis 1 mm. longis. *Ovarium* globulare, 1 mm. diametro,

parce puberulum; stylus 4 mm. longus, parce hirsutus. *Fructus* immaturus (?) circiter 1·8-2 cm. longus.

Philippine Islands. Luzon: Prov. Rizal; Bosoboso, *E. D. Merrill* 2807; Prov. Laguna; San Antonio, 205 m., *Ramos, Bur. Sc. No.* 23814.

This species has been placed under *S. luzonensis* in the Herbarium of the Bureau of Science, but it is quite a distinct species.

The description has been entirely redrawn as the new material (*Ramos* 23814), shows that the flowers in the previously described specimens were only in the bud stage and the corolla tube had not developed.

This species is certainly nearly allied to *S. multiflora*, but is smaller in all its parts and may be distinguished by the pubescence of the stems, the smaller, narrow leaves and the hairy style. With its lax, slender inflorescences like those of a *Ligustrum* it is seen to be quite distinct from *S. multiflora*.

There are several other narrow-leaved specimens from central Luzon without flowers which probably should be referred to *S. Merrillii*, namely *Williams* 350 from Mt. Mariveles, Prov. Bataan and *Elmer* 7820, 7885 from Prov. Tayabas, with sparsely pubescent stems. The Elmer specimens have ovoid fruits 2-2·5 cm. long. There is also a specimen collected by *Ramos* (no. 16621) at San Antonio, Laguna Province, which resembles *S. Merrillii*, but the stems seem scarcely pubescent. The fruits of this specimen contain 3 flattened oblong seeds 2 cm. long by 1·5 cm. broad.

31. **S. pycnoneura,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 164 et figs.

New Guinea. Kaiser-Wilhelmsland: Woods at foot of Bismarck Mts.; 150 m., *Schlechter* 18478 (Fl. Oct.).

It is possible that this species may belong to the section *Penicillatae*, but this cannot be determined from the figures given by Gilg and Benedict. In both *S. Forbesii*, A. W. Hill, and *S. laurina*, Wall., to which the authors suggest it may be allied, the anthers are bearded.

32. **S. myriantha,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 167 et figs.

New Guinea. Kaiser-Wilhelmsland: Hauptlager Malu am Sepik; alluvial forests, 40-50 m., *Ledermann* 10706; 10611 (Fl. Jan.); in forests near Kaulo-Etappe, 400 m., *Schlechter* 17184 (Fl. Jan.).

The plant as figured with its large paniculate inflorescences 12-14 cm. long, and large triplinerved leaves resembles *S. multiflora*. The anthers are glabrous and are borne on relatively long filaments and the ovary is densely hairy.

33. **S. multiflora,** *Benth.* in Journ. Linn. Soc. Bot. i. p. 102; Hook. Ic. xxiii. t. 2213; Vidal, Pl. Vasc. Filip. p. 191;

Miq. Flor. Ned. Ind. ii. add. p. 1080; A. W. Hill in Kew Bull. 1911. p. 300 partim (?) cum Ic. et figs.—*S. luzonensis*, Elmer in Leafl. Philipp. Bot. i. (1908), p. 332 quoad *Elmer* 7885.—*S. potatorum*, L. var. *multiflora*, Vid. Sinops. t. 69, fig. D; "Camotain," Blanco, Flor. Filip. August. t. 208. ed corr.

Philippine Islands. Luzon: Prov. Benguet; Baguio, *Elmer* 8960. Prov. Rizal; *Ahern's Collector* 2875, 3249; Dist. Morong, *Vidal* 1615, 3316; *Loher* 4113, 4114, 4115, 4116, 6483, 6506, 6523, 6540; *Gaudichaud* 305; *Calléry* 40. Prov. Bataan; Mt. Marivales, *Elmer* 6864. Prov. Batangas, *Cuming* 641, 695, 1482. Priv. Albay, *Cuming* 1059.

The leaves are tripli- or quintuplinerved. The corolla measures from 6-7 mm. in length, the lobes being glabrous, and a ring of woolly hairs occurs at the throat. The anthers are about 1·65 mm. in length and glabrous. The style is glabrous or subglabrous, and the ovary is crowned with a mass of erect hairs.

From a careful re-examination of the material at Kew and from specimens kindly sent from the Bureau of Science Herbarium, Philippine Islands, it seems probable that *S. multiflora*, Benth., is confined to the islands of Luzon and Mindoro. The Culion Island plant (cited in *K.B.* 1911), is undoubtedly distinct, but unfortunately the specimen consists only of two leaves and some fruits.

The specimens from Mindanao (see *K.B.* 1911, l.c.), are either leaf specimens with fruits or else have the flowers only in bud. In the former (*Williams* 2131) the fruit is ovoid and smooth. In the latter (*Clemens* 539; *Lyon*), owing to the condition of the flowers, it is not possible to assign the specimens positively to *S. multiflora* or to any other species though they might well belong to *S. lanata*, A. W. Hill. (See footnote p. 126.)

The Ceram specimen (*K.B.* 1911, l.c.), also consisting of leaves and fruit only, cannot safely be placed under *S. multiflora*; it closely resembles a specimen also consisting of leaves and fruit only collected in Amboina by the late *C. B. Robinson*, no. 2030.

As was mentioned in *K.B.* 1911, p. 301, there are some narrow-leaved specimens from Luzon without flowers which probably represent a narrow-leaved form of *S. multiflora*, the fruits when present are rugulose as in the type. These specimens have in some cases been identified as *S. luzonensis*, but the leaves are quite glabrous.

The following specimens at Kew and at Manila bear narrow, lanceolate, acuminate leaves markedly cuneate at the base.

Luzon. Prov. Bataan, *Williams* 350; Prov. Tayabas, *Elmer* 7820; 7885; *Whitford* 776; Prov. Laguna, *Ramos, Bur. Sc. No.* 16621.

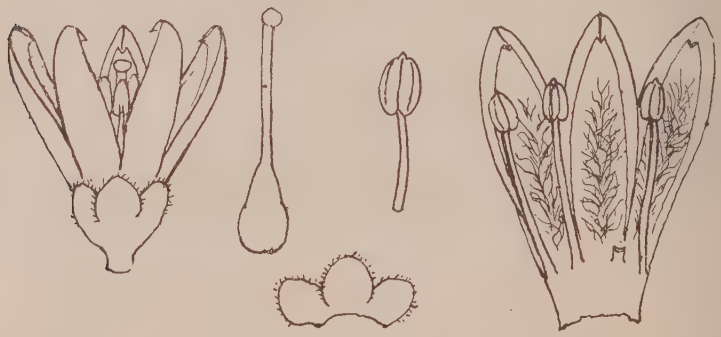
There are two other imperfect specimens from Luzon of doubtful affinity, *Ramos* 1388 from the Prov. Laguna with pubescent stems almost tri-nerved highly reticulate and very acuminate leaves and small round smooth fruits, and *Alvarez, For. Bur. No.* 23750 from the Camarines Prov., Luzon, with triplinerved leaves and yellow oily fruits. The latter is said to be a tree and

shows some resemblance to *S. multiflora*, but both it and *Ramos* 1388 no doubt represent undescribed species.

Another doubtful plant allied to *S. multiflora* is *Ramos Bur. Sc. No.* 21735, from the Province of Bulacan; it shows considerable resemblance to *S. multiflora*, but both in the flowers and leaves there are several small differences. It would seem unwise either to describe it as a new species or to assign it to *S. multiflora* on the single specimen.

34. **S. Curtisii**, *King & Gamble*, Mat. Flor. Mal. Penins. iv. p. 824 partim; descr. emend.

Frutex scandens, 30-45 m. altus vel ultra; caudex 10-30 cm. diametro, ramis crassis striatis in juventute pubescentibus lenticellis elongatis instructis. *Folia* oblongo-ovata, elongata, apice sensim acuta vel acuminata, basi rotundata vel rotundato-cuneata, circiter 9-13 cm. longa, 3·5-5·5 cm. lata, superne vernicosa, glabra, inferne pilis sparse instructa, 5-nervia, subtriplivel trinervia; venis inconspicuis petiolis 1 cm. longis minute pubescentibus. *Inflorescentiae* axillares, paniculatae, multi-



florae, 3·5-4·5 longae, pedunculis pedicellisque pubescentibus. *Calycis* segmenta 1 mm. longa, rotundato-ovata, subacuta, glabra, crassa, concava, marginibus ciliatis. *Corolla* circiter 7·5 mm. longa, externe glabra, lobis anguste elliptico-lanceolatis carnosis cucullatis 5 mm. longis acutis pilis laneis dense instructis; tubo breve glabro. *Antherae* 1 mm. longae, glabrae, exsertae; filamentis 2-2·25 mm. longis. *Ovarium* cum stylo 5·5 mm. longum, pilis erectis instructum. *Fructus* globosus, 2·5-4 cm. diametro; pericarpium laeve, 0·5 mm. crassum. *Semina* 2-4 rotundato-ovoidea, plana, compressa, glabra, circiter 1·6 cm. longa. *S. Maingayi*, King & Gamble, Mat. Flor. Mal. Penins. iv. p. 824, quoad *King's Collector* 8190.

Malay Peninsula. Perak: Gunong Bubu; dense jungle clinging to large trees, 450-610 m. (Fl. June), *King's Collector* 7702; Goping Dist., 90-150 m. (Fr. Sept.), *King's Collector* 8190. Penang: Government Hill; 210-240 m. (Fl. Apr.), *Curtis* 2973.

The specimens collected by *King's Collector* 10281, 10438 included by King & Gamble under *S. Curtisii* prove to belong to *S. septemnervis*, C. B. Clarke.

S. Curtisii is a very distinct plant with its long densely-hairy corolla lobes, short tube and anthers borne on long filaments. It is easily distinguished from *S. septemnervis* by its elliptic straight-sided subtripli- or trinerved leaves with inconspicuous veins. The leaves resemble those of *S. Maingayi*, but are much less varnished than in that species.

The fruiting specimen (*King's Collector* 8190), was placed by King & Gamble under *S. Maingayi*, but from the character of the lenticels and the hairy stems, etc., there can be little doubt that it belongs to *S. Curtisii*. According to the collector's label it is a "very large creeper over 150 ft. long, stems 8-12 in. in diameter."

35. **S. lanata,** *A. W. Hill* in Kew Bull. 1911. p. 299, with text figs.

Philippine Islands. Mindanao; Lake Lanao, *Clemens* 747.

The leaves are triplinerved. The corolla is 7-8 mm. long, the lower part of the lobes and the tube being densely covered with woolly hairs, and the lobes are 5-5·5 mm. long. The anthers are apiculate and glabrous and the ovary and style are hairy.

It is possible that the specimens from Mindanao, referred to *S. multiflora* in *Kew Bull.* 1911. p. 300, really belong to *S. lanata*. The determination was based mainly on the leaf characters as the flowers were not fully developed (see pp. 126 and 163).

Section iii. **Penicillatae.**

36. **S. Benthami,** *C. B. Clarke* in Hook. f. Flor. Brit. Ind. iv. p. 87; descr. emend. et ampl.

Caules quadrangulares, pubescentes. *Folia* ovato-lanceolata, acuta vel acuminata, versus basin plus minusve cuneata vel rotundato-cuneata, 5·5-7·5 cm. longa, 2·5-3·5 cm. lata, superne glabra, pagina inferiore nervo medio hirsuto, 5-nervia, plus minusve triplinervia, nervis intermediis curvatis; petioli 2-3 mm. longi, pubescentes. *Inflorescentiae* axillares, pauciflorae, 5-8 mm. longae; pedunculis pedicellisque pubescentibus. *Calycis* segmenta 4, triangulari-orbiculata, breviter acuta, marginibus breviter ciliatis, intus glabra. *Corolla* 2·5-2·75 mm. longa, lobis 4 crassis 1·5-1·75 mm. longis medio linea pilorum notatis. *Antherae* 0·75 mm. longae, apiculatae, in sinubus insertae, basi barbatae. *Ovarium* cum stylo glabrum, 1·5 mm. longum. *Bacca* circiter 1 cm. diametro; pericarpium crustaceum; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 15; Trimen Fl. Ceylon, pt. iii. p. 174; *S. minor*, Benth. (non Blume) et var. *ovata*, Benth. in Journ. Linn. Soc. i. p. 100; *S. minor*, Thwaites (non Blume) in Enum. Plant. Zeylan. p. 201.

Ceylon. Colombo (1860), *Thwaites* 187; without precise locality, *Mrs. General Walker; Col. Walker* 244; *J. S. Mackenzie; Dr. Kelaart.*

The specimens under the name *S. colubrina*, Ind. Orient. Herb. D. van Royen et herb. Koenig in herb. Mus. Brit. apparently belong to *S. Benthami.*

var. **parvifolia,** *Benth.* in Journ. Linn. Soc. i. p. 101.

Folia ovata, coriacea, marginibus reflexis, 2-2·5 cm. longa, 1-1·8 cm. lata. *Inflorescentiae* pauciflorae, pleraeque terminales. *S. Benthami*, C. B. Clarke var. *parvifolia*, Benth., C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 87; Trimen Fl. Ceylon, pt. iii. p. 174; Dop l.c. p. 15.

Ceylon. Adams Peak (1846), *Thwaites* 341; *Gardner* 580.

var. **angustior,** *Benth.* in Journ. Linn. Soc. i. p. 101.

Folia anguste ovato-lanceolata, acuminata, 3·5-6 cm. longa, 1·1-2 cm. lata, basi anguste cuneata. *Inflorescentiae* pleraeque axillares; Trimen, Fl. Ceylon, pt. iii. p. 174. *S. minor*, Benth. var. *parvifolia*, Thwaites, Enum. p. 201.

Ceylon. Matelli East (1863), *Thwaites* 341; Balanoda (1846), *Thwaites* 187.

S. Benthami, with two of its varieties, *parvifolia* and *angustior* as distinguished by Bentham, is distinct from other species in having a 4-merous corolla and calyx. The young twigs, leaf petioles and the back of the midrib are pubescent. The variety *ovata* of Bentham is not maintained as there is no good character to distinguish it from the type. Bentham's variety *nitida* with its 5-merous flowers, calyx hairy within, rhomboid leaves, etc., has been described as a new species under the name *S. trichocalyx*, A. W. Hill (see p. 174).

37. **S. quintuplinervis,** *A. W. Hill;* species *S. pubescenti*, C. B. Clarke, affinis, foliis late ovatis majoribus glabris calycis segmentibus acutis floribus majoribus praecipue differt.

Frutex scandens; caulibus petiolis et pedunculis pubescentibus. *Folia* late ovata vel ovato-lanceolata, acuta vel acuminata, basi roundata vel rotundato-cuneata, circiter 8-10 cm. longa, 4·5-6 cm. lata, glabra (in sicco fusca), quintuplinervia, superne vernicosa, venis transversis distantibus. *Inflorescentiae* axillares; corymbi 1·5-2 cm. longi, multiflori. *Calycis* segmenta triangulari-ovata, acuta, 1 mm. longa, marginibus ciliatis. *Corolla* 4 mm. longa, lobis 1·5 mm. longis ovatis acutis ad basin linea pilorum transverse notatis. *Antherae* in tubo insertae, 0·65-0·75 mm. longae, ad basin tantum barbatae. *Ovarium* cum stylo glabrum, 2 mm. longum. *Bacca* (*Curtis* 3044) ovoidea, 2·5-3 cm. longa, monosperma; pericarpium crustaceum. *Semina* 2 cm. longa, plana. *S. malaccensis*, King & Gamble, Mat. Flor. Mal. Penins. iv. p. 829, partim non Benth. *S. ovalifolia*. Gamble. l.c. p. 826 partim non Wall.

Malay Peninsula. Penang: 30-150 m. (April), *King's Collector* 1539; Waterfall near Stone Quarry (Fr. July), 60 m., *Curtis' Collector* 3044; Govt. Hill, *Curtis* 3044 (?); waterfall, *Ridley* 5538 in herb. Mus. Brit.; Muka Head, *Curtis* 1515; rocky locality, dense jungle, 90-150 m., *King's Collector* 4865.

38. **S. pubescens,** *C. B. Clarke* in Hook. f. Flor. Brit. Ind. iv. p. 89; descr. ampl.

Frutex scandens (*Curtis*) omnino dense pubescens. *Folia* ovata, acuta vel acuminata, basi rotundata vel rotundato-cuneata vel subcordata, 4·5-6 cm. longa, 2-3 cm. lata, pubescentia, 5-nervia, quintuplinervia, pilis paginae inferioris areolis coloratis circumdatis, nervis praecipue pubescentibus, petiolis brevibus dense pubescentibus. *Inflorescentiae* axillares vel terminales, corymbiformes, compactae, 1-1·5 cm. longae. *Calycis* segmenta orbiculari-ovata, subacuta, pubescentia, marginibus ciliatis. *Corolla* 3·65 mm. longa, lobis 1·4 mm. longis crassis cucullatis ad basin linea pilorum notatis. *Antherae* in tubo medio insertae, apiculatae, 0·65 mm. longae, basi barbatae. *Ovarium* cum stylo circiter 1·5 mm. longum, glabrum. *Fructus* pericarpio crustaceo instructus. *Semina* peltata, hemispherica, circiter 7 mm. diametro; King & Gamble, Mat. Flor. Mal. Penins. iv. p. 830 partim; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 16 et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 165 spec. Ind.-Chin. excl.; A. W. Hill in Kew Bull. 1911, p. 292.

Malay Peninsula. Malacca: *Maingay* 1974 (*K.D.* 1040); Bukit Bruang (May), *Curtis* 3494.

Singapore: Bukit Tunah, 150 m., *Ridley* 6317.

Borneo. Sarawak; Mattang, *Beccari* 2035.

Thorel's plant from Angkor placed by Dop under *S. pubescens* proves to be a new species which has been described and given the name *S. mucronata*, A. W. Hill (see p. 187).

39. **S. Ridleyi**, *King & Gamble*, Mat. Flor. Mal. Penins. iv. p. 831; descr. ampl.

Frutex glaber. *Folia* glabra, nervorum axillis paginae inferioris excepta, subtriplinervia. *Inflorescentiae* axillares, circiter 1·5 cm. longae, pauciflorae. *Calycis* segmenta glabra, marginibus ciliatis. *Corolla* 4-4·25 mm. longa, lobis circiter 1·5 mm. longis intus ad basin linea pilorum transverse notatis etiam parte superiore pilis erectis copiose instructis. *Antherae* 0·75 mm. longae, basi barbatae, filamentis 0·5 mm. longis in tubo insertis. *Ovarium* cum stylo glabrum; non Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 16, nec in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 165.

Singapore. Toas, *Ridley* 6313.

A distinct plant with its glabrous subtriplinerved or almost trinerved leaves. The corolla lobes are unlike those of other species in this section in being provided with a mass of erect hairs covering the inner faces above the transverse line of bristles.

Three distinct plants in the Paris Herbarium have been placed by Dop under *S. Ridleyi*. The specimens collected by *Pierre* belong to *S. armata*, A. W. Hill; those by *Thorel* near Ti-tinh consist of leaves only which resemble those of *S. Scortechinii*, A. W. Hill, while the third set collected at Pak-lay by *Thorel* show some general resemblance to *S. trichocalyx*, A. W. Hill, and probably represent an undescribed species.

40. **S. Robinsonii,** *A. W. Hill*; species distincta, foliis glabris grandis conspicue venatis.

Frutex scandens, lignosa, ramis in juventute pubescentibus, internodiis elongatis. *Folia* elliptico-lanceolata, acuta vel subacuminata, basi rotundato-cuneata, 10-16 cm. longa, 4·5-8 cm. lata, glabra, triplinervia, nervis pagina superiore paullo impressis venis eminentibus; petioli in juventute pubescentes, 0·5-1 cm. longi. *Inflorescentiae* axillares, paniculatae, 2·5-3 cm. longae et latae, pauciflorae; pedunculis pedicellisque hirsutis. *Calyx* 1 mm. longus, subglaber, segmentis late ovatis acutis marginibus ciliatis. *Corolla* 4·5 mm. longa, lobis 2 mm. longis intus ad basin linea pilorum notatis. *Antherae* triangulares, 1 mm. longae, in tubo medio insertae, basi barbatae. *Ovarium* cum stylo glabrum, 2·25 mm. longum. *Fructus* globosus, circiter 2 cm., diametro; pericarpium crustaceum, glabrum.

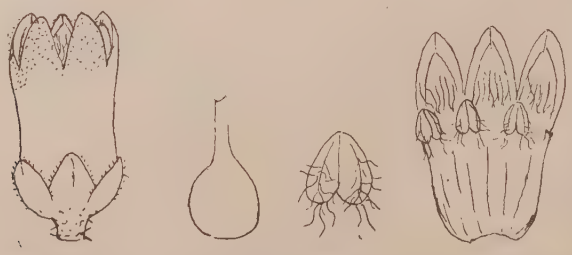
Amboina. Hitoe messen; in forests, 200 m. (Oct.), *C. B. Robinson* 2029.

A very distinct species with its large, conspicuously veined leaves. The name is given in memory of the late C. B. Robinson who was killed in Amboina when collecting over the classic ground visited by Rumphius.

Another *Strychnos* collected by Robinson in Amboina (no. 2030), is unfortunately indeterminable owing to lack of flowers, but certainly represents a distinct species.

41. **S. Scortechinii,** *A. W. Hill*; species *S. pubescenti*, C. B. Clarke, affinis, foliis ovatis vel ovato-ellipticis laevibus trinervis vel subtriplinervis dense rufo-pubescentibus antheris marginibus barbatis distincta.

Frutex scandens, 10-15 m. longus, omnino dense rufo-pubescens, ramulis horizontalibus. *Folia* ovata vel ovato-elliptica, 4-9 cm. longa, 2·5-3·5 cm. lata, basi cuneata vel rotundata, trinervia vel in foliis grandibus subtriplinervia, venis distantibus paginis laevibus inferiore praecipue dense rufo-pubescentibus, cirrhis simplicibus. *Inflorescentiae* axillares, congestae, circiter 1 cm. longae, pedunculis pedicellisque brevibus subglabris. *Calycis* segmenta rotundata vel truncata, subacuta, 0·5 mm. longa, glabra, marginibus ciliatis exceptis.



Corolla 3-3·5 mm. longa, lobis 1-1·5 mm. longis ad basin linea pilorum notatis. *Antherae* in tubo insertae, 0·65 mm. longae, basi et ad margines barbatae. *Ovarium* globulare, glabrum;

stylus 1 mm. longus. *Bacca* obovoideo-oblonga, elongata, 2-2·2 cm. longa, 1-1·2 cm. diametro, 1-2 sperma; pericarpium tenue, vernicosum, crustaceum; semina ovoideo-elliptica, acuta, plano-subconvexa, 1·7 cm. longa, 7-8 mm. lata. *S. rufa*, King & Gamble, Mat. Flor. Mal. Penins. iv. p. 827 partim, non Clarke in Hook. f. Flor. Brit. Ind. iv. p. 89. *S. pubescens* var. *Scortechinii*, King & Gamble l.c. p. 830.

Malay Peninsula. Perak: Larut: open sandy marshy ground; 90 m. (March), *King's Collector* 3973; 6199; 7839; 10187; Kelan Tujor, 150 m. (April), *L. Wray Jr.* 4033; 1344; 2894.

Selangor: *Curtis* 2398 (teste Icon. J. S. Gamble in herb. Gamble); Dambung Batak *Scortechini* 1858; Campar, *Ridley* 9698.

The fruit is obovoid with a thin pericarp and contains one or two seeds. It is very different from the large, many-seeded fruit of Clarke's *S. rufa*, founded on Maingay's plant from Malacca (see p. 203).

The specimens turn black on drying; the leaves, except when very large, are trinerved and are unlike those of *S. pubescens*, C. B. Clarke, which are quintuplinerved and remain green when dried.

42. **S. axillaris,** *Colebr.* in Trans. Linn. Soc. xii. 356. t. 15 descr. ampl.

Frutex, ramis et ramulis pubescentibus; cirrhis singulis. *Folia* triplinervia, glabra nervis paginae superioris excepta, superne vernicosa, in siccitate atro-fusca, nervis pubescentibus, pagina inferiore nervorum angulis pubescentibus; petiolis pubescentibus. *Inflorescentiae* axillares, compressae. *Calycis* segmenta triangulari-ovata, acuta, marginibus exceptis glabra. *Corolla* 2·5 mm. longa, lobis 1 mm. longis acutis ad basin linea pilorum transverse notatis. *Antherae* ovatae, apiculatae, 0·75 mm. longae, basi barbatae, subsessiles, in tubo medio insertae. *Ovarium* cum stylo glabrum, 1·75 mm. longum. *Fructus* elliptico-globularis, olivae magnitudine, monospermus (*Colebrooke*); Wall. Cat. 1587; G. Don, Dict. iv. p. 66; A. DC. in DC. Prodr. ix. p. 13; Roxb. Fl. Ind. ii. p. 266; Benth. in Journ. Linn., Soc. i. p. 101; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 89; Brandis, Indian Trees, p. 475; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, p. 16; non Dalz. et. Gibs. Bomb. Fl. p. 155.

India. E. Bengal: Silhet; *M. R. Smith & W. Gomez in Herb. Wallich* 1587; Khasia Hills, Jasper Hill (June), *Hooker & Thomson* 1147; *Griffith K.D.* 3721; Assam, Lumathu Hills, *Prazer* 79.

S. axillaris is a particularly distinct plant in the dry condition since leaves and flowers become a black-brown, whereas *S. pubescens*, to which it shows some resemblance, always remains a yellowish-green colour. The nerves on the upper surfaces of the leaves bear a line of hairs, and on the under surface there is a pocket of hairs in the angles of the nerves. The flowers

bear a transverse line of erect bristle-like hairs across the base of the corolla lobes characteristic of all the species in this section of the genus. *S. axillaris* is correctly described by Colebrooke and also by Wallich in Roxb. Fl. Ind. ii. p. 266.

Some doubt has arisen as to this species and Roxburgh's *S. colubrina*, since both plants were found by M. R. Smith, indigenous on the hills near Silhet, and Smith's specimen assigned to *S. colubrina* by Roxburgh cannot be found in any herbarium. Hooker & Thomson and also Prazer collected a second *Strychnos* near Silhet, which is apparently Smith's lost plant.

Smith recognised that he had found two distinct plants near Silhet, as his label on *S. axillaris* bears the MS. name *S. Harkuchila*, and the remark "diff. a *St. colubrina*," the reference being no doubt to his Silhet plant described under that name in the Flora Indica by Roxburgh.

Colebrooke's figure is a very good one, and shows the fruit as a small berry about the size of an olive with a solitary seed. The plant turns black or dark-brown on drying as do certain other species in this section of the genus.

S. axillaris is quite distinct from *S. Tieuté*, Lesch. from Java, with which Colebrooke suggests a comparison.

43. **S. Schmidtii,** *Gilg* in Flora of Koh Chang (Bot. Tidssk. xxxii. April, 1916), pt. x. p. 388 (312); descr. ampl.

Folia trinervia. *Flores* immaturi corollae lobi ad faucem linea pilorum notati. *Antherae* in tubo insertae, subapiculatae, 0·65 mm. longae, basi et marginibus parte inferiore barbatae. *Ovarium* cum stylo glabrum, 1·65 mm. longum.

Siam. Rocks in jungle at Klong Prao (March), *Schmidt* 703.

This species shows some resemblance to *S. Ridleyi*, King & Gamble, from Singapore, but there is not sufficient material to assert that it is closely related.

44. **S. armata,** *A. W. Hill*; arbor parva, spinis teretibus foliisque trinervis distincta.

Arbuscula 3-8 m. alta, ramis decumbentibus facie *Canthii*, (*Pierre*), in juventute pubescentibus spinis teretibus axillaribus 5-6 mm. longis interdum instructis. *Folia* elliptico-ovata vel lanceolata, basi cuneata, apice acute acuminata, superne vernicosa, in siccitate atro-fusca, trinervia, nervo medio pagina superiore et inferiore et marginibus pubescentibus, petiolis circiter 5 mm. longis pubescentibus. *Inflorescentiae* axillares, vix maturae, circiter 1 cm. longae. *Calycis* segmenta orbiculari-ovata, acuta vel subacuta, 0·75 cm. longa, marginibus ciliatis. Corolla in alabastro 1·75 mm. longa tubo (?) praecipue immaturo, lobis 1·25 cm. longis linea pilorum transverse notatis. *Antherae* 0·5 mm. longae, barbatae, in tubo insertae. *Ovarium* cum stylo glabrum. *S. Ridleyi*, Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 16. et in Flor. Gén. Ind.-Chin. iv. p. 165 partim; non King & Gamble, Mat. Flor. Mal. Penins, iv. p. 831.

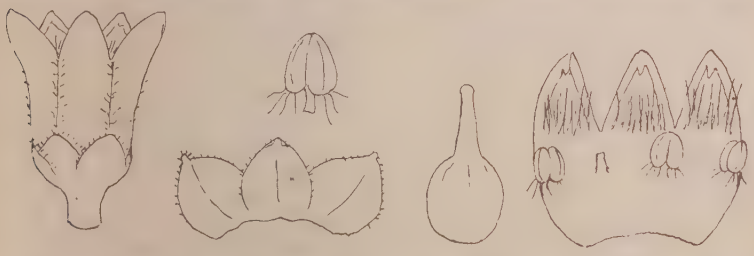
Cochin-China. Prov. Saigon; Thuduc (Apr.), *Pierre* 329, 331 in herb. Mus. Paris.

Dop has referred Pierre's specimens from Thuduc to *S. Ridleyi*, King & Gamble. The plant however is a small tree with thorns, trinerved leaves with margins and median nerves pubescent, and is quite distinct from *S. Ridleyi*.

The specimens from Pak-lay quoted by Dop under *S. Ridleyi* are quite distinct and belong to an undescribed species.

45. **S. plumosa,** *A. W. Hill;* species *S. Ridleyi*, King & Gamble et *S. Schmidtii*, Gilg, affinis, ramis et foliorum nervis dense pubescentibus, corollae tubo lineatim pubescente praecipue differt.

Frutex scandens, lignosus, ramis ramulisque dense et minute pubescentibus. *Folia* ovata vel ovato-cuneata, acuta, basi rotundata, 6-7·5 cm. longa, 3-4 cm. lata, trinervia, coriacea, superne vernicosa, nervis pubescentibus venis inconspicuis, petiolis circiter 5 mm. longis pubescentibus, cirrhis simplicibus. *Inflorescentiae* axillares, corymbosae, compactae, 1·5 cm. longae, multiflorae; pedunculis pedicellisque pubescentibus. *Calycis* segmenta late



ovata, acuta, 0·75 mm. longa, 1 mm. lata, marginibus breviter ciliatis. *Corolla* viridis, 3·25 mm. longa, externe pilis in lineas 5 sub sinubus productas instructa; lobi 1 mm. longi, linea pilorum erectorum ad basin instructi. *Antherae* in tubo insertae, orbiculari-ovatae, 0·75 mm. longae, basi barbatae, filamentis 0·5 mm. longis. *Ovarium* cum stylo glabrum; stylus 1 mm. longus. *Fructus* ignotus.

Siam. Me K'mi; limestone rocks, 270 m., *Kerr* 2372.

This species is allied both to *S. Ridleyi*, King & Gamble, and to *S. Schmidtii*, Gilg. It differs from both in the densely pubescent stem and leaf nerves and in the external lines of hairs on the corolla. These lines of hairs run down the outside of the tube from the sutures between the corolla lobes, and mark out the portions of the tube belonging to each corolla lobe.

46. **S. psilosperma,** *F. Muell.* Fragm. iv. p. 44; vi. p. 131; descr. ampl.

Frutex glaber. *Folia* late ovata, basi abrupte cuneata, apice acuta vel breviter acuminata, 5-7·5 cm. longa, 4-5 cm. lata, glabra, 5-nervia, subtriplinervia. *Inflorescentiae* paniculatae, axillares, 4-7 cm. longae, sublaxae, pedunculis pedicellisque glabris. *Calycis* segmenta orbiculari-ovata, subacuta, 1 mm. longa, glabra vel subglabra, marginibus ciliatis. *Corolla* 4 mm.

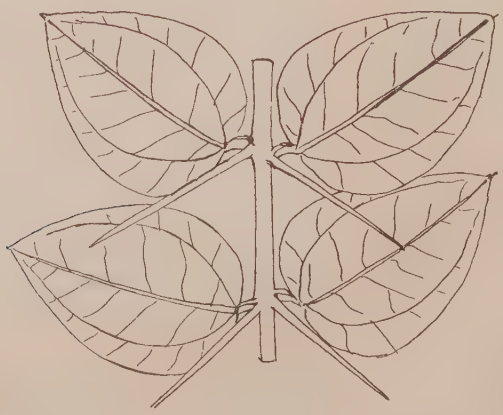
longa; lobi 2 mm. longi, ovato-lanceolati, acuti, intus medio linea pilorum transverse notati. *Antherae* in tubo medio insertae, 1 mm. longae, in latere basi et apice hirsutae. *Ovarium* cum stylo glabrum vel subglabrum; stylus 1 mm. longus. *Bacca* globosa, 0·8-1 cm. diametro, monosperma; pericarpium crustaceum, laeve. *Semen* globosum, glabrum, corneum; Benth. Fl. Austral. iv. p. 369; Bailey, Queensland Flora, iii. p. 1024, partim; Cat. Queensland Woods, p. 59, quoad spec. Trop. Queensland. tantum.

Queensland. Mount Archer, *F. von Mueller*; Edgcumbe Bay, *Dallachy*; Percy Islands, *A. Cunningham*; Percy Islands, *Cunningham* 112; Pine Island, *Tryon*; Rockhampton Dist. *F. von Mueller* 834 in herb. Mus. Brit.; East Coast, *R. Brown* in herb. Mus. Brit. and without collector in Queensland herb.; Eidsvold, *Dr. T. L. Bancroft;* Tooloomba, *F. M. Bailey*.

This species is described by F. von Mueller as "a glabrous shrub with weak but scarcely climbing branches." The plant described by Bailey in the Queensland Flora as "an erect tree 60 or more feet high armed with slender spines 1 in. long" in the Brisbane district proves to be *S. arborea*, A. W. Hill.

47. **Strychnos arborea,** *A. W. Hill*, arbor *S. psilospermae*, F. Muell., similis, sed ramis et foliorum nervis pubescentibus floribus minoribus antheris basi tantum barbatis fructibus minoribus praecipue differt.

Arbor circiter 12 m. alta, inermis (fide *J. L. Boorman*), stirpe 25-30 cm. diametro, ramis et ramulis pubescentibus, ramulis in juventute spinis teretibus glabris acutis 1·5-2 cm. longis supra-axillaribus caducis instructis (fide *J. H. Maiden*



et spec.). *Folia* late ovato-lanceolata vel rhomboidea, basi rotundato-cuneata, apice cuneata, acuta, mucronata, coriacea, marginibus reflexis, circiter 4·5-7·5 cm. longa, 3-5 cm. lata, sub-

trinervia vel triplinervia, pagina inferiore nervis parce hirsutis, venis pinnatifidis et nervo medio conspicuis, petiolis brevibus parce hirsutis. *Inflorescentiae* axillares, compressae, 1·5-2 cm. longae, pedunculis pubescentibus. *Calycis* segmenta triangulari-ovata, acuta, glabra, 0·5-0·75 mm. longa, marginibus ciliatis. *Corolla* 3 mm. longa; lobi 1·75 mm. longi, triangulari-ovati, acuti, crassi, intus ad basin linea pilorum transverse

notati. *Antherae* 0·75 mm. longae, apiculatae, basi barbatae, filamentis paullo sub sinubus insertis. *Ovarium* cum stylo glabrum. *Fructus* globosus, 8 mm. diametro, monospermus; pericarpium crustaceum, tenue, vernicosum. *Semina* glabra. *S. psilosperma*, Maiden & Betche in Proc. Linn. Soc. New South Wales, xxx. pt. iii. 1905, p. 368; Census of N.S. Wales Plants, p. 172; Bailey, Queensland Plants, iii. p. 1024, quoad spec. arborem ex dist. Brisbane.

Queensland. Eumundi; "a small tree" *F. M. Bailey.*

New South Wales. Macpherson Range; Koreelah Peak to White Swamp, *J. H. Maiden*; Acacia Creek, *W. Dunn*; *J. L. Boorman* 205.

This species from New South Wales on the borders of Queensland and from Eumundi about 65 m. north of Brisbane is distinct in being a tree of some 40-60 ft. in height with a trunk 10 in.-1 ft. in diameter. It is further distinguished from *S. psilosperma* by its pubescent stems and the somewhat marked pinnate venation springing from the median nerve of the leaf and also by the sharp axillary spines. The inflorescences are compact, and bear smaller flowers than those of the northern species. A specimen of the timber collected by J. L. Boorman presented to Kew by Mr. J. H. Maiden is remarkably heavy and close grained. The wood is a pale straw-colour with a pitted appearance in transverse section due to patches of interxylary phloem.

The tree is described by Boorman (see Maiden & Betche, Proc. Linn. Soc. N.S.W. l.c.) as a handsome compact tree without any spines (see note under *S. psilosperma*, Muell.), but Mr. Maiden informs me that spines are present on the young shoots and that they disappear as growth proceeds. The specimen of

a young twig he sends from Koreelah Peak bears a sharp supra-axillary spine just above each leaf axil (see fig.).

Thanks to the kindness of Mr. C. T. White, Acting Government Botanist, Brisbane, in sending a specimen of F. M. Bailey's *Strychnos 'psilosperma'* from Eumundi, it is now possible to clear up the difficulties about this plant. It proves to be *S. arborea*, A. W. Hill and not *S. psilosperma*. It was this specimen, no doubt, which caused Bailey to say in The Queensland Flora that *S. psilosperma* in the Brisbane district is "an erect tree 60 or more feet high armed with slender spines 1 in. long."

The following particulars taken from Bailey's catalogue of Queensland Woods* refer to *S. arborea*, though the opening sentence as to the Tropical Queensland shrub refers to *S. psilosperma*.

"286.—*S. psilosperma*, F. v. M., Fragm., iv., 44; Flora Austr., iv., 369. In Tropical Queensland, a rambling shrub; but on Taylor's Range, near Brisbane, a fine erect small tree of 60 or more feet and armed with slender spines 1 in. long. Leaves broadly ovate, 3- to 5-nerved, 1 to 2 in. long; berry globular."

"Wood light-yellow with numerous white longitudinal streaks, the centre black or dark, the grain close; very hard and tough."

The habitat of this new species is therefore the country around Brisbane to the New South Wales border. The exact northern boundaries are somewhat uncertain, but to the south it does not appear to extend beyond the Macpherson Range.

48. **S. trichocalyx,** *A. W. Hill;* species *S. Dalzellii*, C. B. Clarke, calyce intus hirsuto affinis, sed foliis rhomboideis basi cuneatis floribus minoribus praecipue differt.

Frutex scandens (?). *Caules* in juventute pubescentes, striati, subquadrangulares. *Folia* obovata vel rhomboidea, versus apicem cuneata, acuta vel acuminata, basi cuneata in petiolis angustata, 5-7·5 cm. longa, 3-5 cm. lata, coriacea, superne vernicosa et glabra, marginibus paullo reflexis, pagina inferiore in angulis nervorum saepius hirsuta, 5-nervia, triplinervia, nervis intermediis rectis non curvatis cum nervo medio acutangulos facientibus; petioli 0·5-1 cm. longi, glabri; cirrhi simplices. *Inflorescentiae* axillares, 1-1·5 cm. longae, congestae, pedunculis pedicellisque pubescentibus. *Calycis* segmenta 5, subrotunda, marginibus ciliatis intus ad basin pilis erectis lineatim instructis. *Corolla* 3·5 mm. longa, 5-loba, lobis 2·5 mm. longis ellipticis subacutis crassis, intus supra medium linea pilorum notatis. *Antherae* 0·75-1 mm. longae, orbiculari-ovatae, ad basin et paullo ad margines conspicue barbatae. *Ovarium* cum stylo glabrum, 1·75-2 mm. longum. *Bacca* globoso-ovoidea, circiter 1·5 cm. longa, 1-2-sperma; pericarpium crustaceum. *S. minor,*

* Catalogue of the Indigenous Woods contained in the Queensland Court, Colonial and Indian Exhibition of 1886. By Fredk. Manson Bailey, F.L.S., p. 59.

Benth. var. *nitida*, Benth. in Journ. Linn. Soc. i. p. 101 (non *S. minor*, Blume). *S. colubrina*, Thwaites, Enum. Plant. Zeyl.

p. 201, non Linn.; *S. colubrina* var. *zeylanica*, Clarke in Hook. f. Flor. Brit. India, iv. p. 87; Trimen, Flor. Ceylon, iii. p. 173. *S. micrantha* var. *rhomboidalis*, Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 14, quoad spec. Zeylan. tantum.

Ceylon. Galagoma, *Thwaites* 330; without precise locality, *Thwaites* 2516; *Col. Walker* in herb. Wight; *Mrs. Genl. Walker* in herb. Hook. (in herb. Kew); Kandy, *A. Moon* 346; without locality, *Macrae* 197 in herb. Mus. Brit.; Galle, *Pierre* (1865) in herb. Mus. Paris.

A striking species with its rhomboid leaves, conspicuously cuneate or acute towards both base and apex. The specimens at the British Museum have single tendrils so presumably the plant is scandent. It is distinguished from *S. Benthami* by the 5-merous flowers and by the irregular line of erect hairs springing from near the base of the inner surface of the calyx segments as well as by the leaves.

Clarke placed this plant under *S. colubrina*, an unfortunate position since it differs from that species both in the character of the corolla hairs and also in its glabrous ovary. Dop in pointing out the latter difference places it as a variety *rhomboidalis* under *S. micrantha*, a distinct species with woolly corolla hairs; he also adds a plant from Cochin which proves to be *S. Dalzellii*.

The true alliance of this peculiar Ceylon species is no doubt with *S. Dalzellii*, Clarke, from S. India, for not only is there some general similarity in the foliage but the line of internal calyx hairs is found in both species—a feature not seen in any other eastern species of *Strychnos*; in the corolla there is also close resemblance.

According to Trimen this plant is rather common in the dry and intermediate regions of Ceylon.

Attached to the Pierre specimen at Paris is a beautiful series of drawings by E. Delpy (1903) showing the internal calyx hairs of this species.

49. **S. Dalzellii,** *C. B. Clarke* in Hook. f. Flor. Brit. Ind. iv. p. 87; descr. ampl. et emend.

Folia late ovata vel ovato-lanceolata, acuta, basi rotundata vel cuneata, triplinervia. *Inflorescentiae* axillares, corymbosae, 2-2·5 cm. longae. *Calycis* segmenta orbicularia, obtusa, glabra, marginibus minute ciliatis, intus ad basin pilis erectis lineatim instructis. *Corolla* 4-4·5 mm. longa, lobis crassis lanceolatis

2·5-3 mm. longis intus medio linea pilorum erectorum transverse notatis. *Antherae* 1 mm. longae, basi barbatae, filamentis in sinubus affixis. *Ovarium* cum stylo glabrum. *Fructus* (? maturus) globosus, circiter 1·5 cm. diametro; pericarpium crustaceum, 0·25 mm. crassum (*Ritchie* 1867); Cooke, Fl. Bombay, ii. p. 185; Beddome, Indian Trees, p. 474; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, p. 14. syn. omn. excl. *S. axillaris,* Dalz. & Gibs., Bomb. Fl. p. 155 non Colebr.; *S. micrantha* var. *rhomboidalis,* Dop, l.c. quoad spec. Cochin tantum.

S. India. Western Mysore; Bababoodun Hills, *Law;* Lóopu West, near Purwur, *Ritchie* 1867; without precise locality, *Dalzell;* Bombay Presidency, *Gibson;* N. Canara, Anmodi, *Talbot* 1622; Cochin, *Pierre* (1878) in herb. Mus. Paris.

Var. **lanceolaris,** *A. W. Hill. Folia* anguste lanceolata, acuminata, 7-10·5 cm. longa, 2-3 cm. lata, triplinervia, basi cuneata. *Inflorescentiae* axillares, 1·5 cm. longae, congestae. *Calycis* segmenta orbicularia, marginibus fimbriatis exceptis glabra, intus ad basin pilis erectis lineatim instructis. *Corolla* 3·25 cm. longa, lobis 2 mm. longis crassis intus medio linea pilorum transverse notatis. *Antherae* 0·75 mm. longae, glabrae vel subglabrae. *Ovarium* cum stylo glabrum.

S. India. Manantoddy & Coorg, without indication of collector, in *herb. Mus. Madras;* also scrap attached to sheet 42 *Beddome* from Malabar in herb. Kew. (?)

Dop (l.c.) is incorrect in citing *S. colubrina,* Wall. in Fl. Ind. ii. 264 and A. DC. ix. p. 14 (in part) as synonyms of *S. Dalzellii.* These citations belong partly to *S. cinnamomifolia* var. *Wightii,* A. W. Hill, and partly to *S. axillaris,* Colebr. Dalzell & Gibson mention that their specimens are insufficient to determine whether they should be referred to *S. axillaris,* Colebr. or not. Dalzell's specimen at Kew bears the name "*S. axillaris*" in his own handwriting but it is quite distinct from that species which is a native of Silhet.

50. **S. malaccensis,** *Benth.* in Journ. Linn. Soc. i. p. 101; descr. emend. et ampl.

Caules minute pubescentes. *Folia* ovata vel late ovata, 6-9 cm. longa, 4-5 cm. lata, acuta vel acuminata, basi rotundata, quintuplinervia, nervis exceptis glabra, venis transversis confertis paginis superioribus et inferioribus laevibus, superioribus vernicosis, petiolis nervisque leviter pubescentibus. *Inflorescentiae* axillares, interrupte paniculatae; corymbi laterales circiter 1 cm. longi, multiflori, pedunculis et pedicellis paullo pubescentibus. *Calycis* segmenta triangulari-ovata, acuta, glabra, circiter 0·75 mm. longa, marginibus ciliatis. *Corolla* 2·5 mm. longa, lobis ovatis acutis crassis 1·75 mm. longis medio linea pilorum transverse notatis. *Antherae* ovatae, 0·75 mm. longae, in sinubus insertae, basi dense barbatae et omnino hirsutae. *Ovarium* cum stylo 2 mm. longum, glabrum; stylus 1·25 mm. longus. *Bacca* (*Ridley* 13001) ovoidea, glabra, crustacea, monosperma, 2 cm. longa. *Semina* ovoidea, plana; Miq. Flor. Ned. Ind. ii. pp. 379, 108; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 89 quoad spec. Malacc. tantum (non *S. Gautheriana,* Pierre); King & Gamble, Mat. Flor. Mal. Penins. iv. p. 828, partim.

Malay Peninsula. Malacca: *Griffith* 3724.

Singapore: Garden Jungle, *Ridley* 13001.

This species resembles *S. penicillata,* A. W. Hill, in its quintuplinerved leaves; they are however quite smooth and not subscabrid with pustules as in that species; only the nerves on both surfaces are slightly hairy. It differs also in the inflorescences and flowers. Clarke placed *S. Gautheriana,* Pierre, from Cochin-China, under *S. malaccensis,* with which it has no near affinity as it belongs to the long-tubed section of the genus. King & Gamble follow Clarke with regard to *S. Gautheriana*

and the mistake is corrected by Dop in his "Contribution to the study of the Asiatic Loganiaceae."*

Another plant placed by King & Gamble under *S. malaccensis* is *Helfer* 3724, which apparently belongs to *S. laurina*. The Penang plant, *King's Collector* no. 1539, also placed under *S. malaccensis* by *King & Gamble* is described as a new species (*S. quintuplinervis*, A. W. Hill, see p. 166), being distinguished from *S. malaccensis* by the more broadly ovate leaves with distant transverse veins, axillary inflorescences, and larger flowers with the anthers included in the corolla tube.

S. malaccensis therefore appears to be confined to the Malacca and Singapore region, and not to extend northwards. It is not closely related to *S. colubrina* as Bentham and Miquel suggest.

51. **S. penicillata,** *A. W. Hill*; species *S. pubescenti*, C. B. Clarke, affinis, sed foliis majoribus late ovatis pustulis munitis inflorescentiis terminalibus antheris in sinubus insertis praecipue differt.

Frutex scandens, omnino pubescens. *Folia* ovato- vel late ovato-lanceolata, acuta vel acuminata, basi rotundata, 6·5-9·5 cm. longa, 3·5-5 cm. lata, 5-nervia, plus minusve quintuplinervia, nervis praecipue pubescentibus omnino pilis pustulis minutis insidentibus; petiolis 5-7 mm. longis. *Inflorescentiae* terminales, corymbosae, multiflorae, 2·5-3 cm. latae. *Calycis* segmenta pubescentia, late ovato-orbicularia, acuta vel subacuta. *Corolla* 4-4·25 mm. longa, externe subpubescens, lobis 2·5-2·75 mm. longis elliptico-lanceolatis acutis vel subacutis intus medio linea pilorum transverse notatis penicillo similibus. *Antherae* ovato-lanceolatae, in sinubus vel paullo sub sinubus insertae, 0·85-1 mm. longae, conspicue apiculatae, ad basin et paullo ad margines barbatae. *Ovarium* cum stylo glabrum, 1·5 mm. longum. *Bacca* ovoidea, 1·5-2 cm. longa, 1-2 sperma; pericarpium crustaceum. *S. pubescens* King & Gamble, Mat. Flor. Mal. Penins. iv. p. 830 partim.

Malay Peninsula. Perak: Larut; 90 m. (Oct.), *King's Collector* 2441; 3623; 6276; 6477; *Scortechini* 1485; Selama, plains, *L. Wray* 4278; Thaiping Waterfall, *Ridley* 3006; Thaiping, *Wray* 3048; *Haniff & Nur* 2401; Kelan Tujor, *Wray* 1916.

Pulau Penang: Government Hill, 600 m., *Curtis* 3649; Muka Head (Aug.), *Curtis* 970.

Negri Sembilan: Perheutian Tuiggi (Dec.), *Ridley* 10089.

This species differs from *S. pubescens*, C. B. Clarke, chiefly in the larger leaves, terminal inflorescences and larger flowers with anthers inserted in the sinuses of the corolla lobes instead of in the tube. King & Gamble's variety of *S. pubescens* named *Scortechini* has been raised to the rank of a species (see p. 168).

52. **S. Wenzelii,** *Merr.* in Philip. Journ. Sc. xi. No. 4. Bot. (1916), p. 202. partim *Ramos* 24381 excl.

Philippine Islands. Leyte; near Tacloban, *Wenzel* 1319, 1569.

* Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 17.

The flowers bear a line of erect hairs mid-way across the corolla lobes and the anthers, which are inserted in the sinuses, are bearded at the base. The calyx segments are coriaceous and glabrous with fringed margins. The leaves are large, markedly triplinerved to quintuplinerved, glabrous, brown in the dry state but with both surfaces shining. The nerves are slightly impressed on the upper surface and the veins are fairly conspicuous.

Merrill includes a specimen collected in the neighbouring island of Samar under *S. Wenzelii*, but it is no doubt a distinct though possibly a nearly related species to which the name *S. tesseroidea*, A. W. Hill, has been given. The leaves resemble those of *S. Wenzelii* in general shape and colour when dry, but they are trinerved, the nerves springing from the base of the leaf. Merrill, to include the Samar plant, describes the leaves of *S. Wenzelii* as "5-pli- vel 5-nervia"; "5-nervia" should be omitted from his description. The young stems and the petioles are furnished with hairs and on the back of the leaf the median nerve especially is markedly pubescent, the general surface being glabrous and dull. The main veins are more distant than in *S. Wenzelii*. The fruit of the Samar plant appears to be rather larger, and the seed, which is also horny and glabrous, is about 9 mm. long by 4 mm. broad, being tesseroid in shape with sharp angles (see p. 206). The seed of *S. Wenzelii* is more or less circular in outline and is flattened on one side.

53. **S. Ledermannii,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 169.

New Guinea. Kaiser-Wilhelmsland: Etappenberg; dense high wood, 850 m., *Ledermann* 8927; 9224; 9435 (Fl. Oct.).

The corolla is 2·5 mm. long with the lobes 1·5 mm. long. The throat is described as being slightly and very shortly hairy, but whether there is a line of erect hairs across the lobes or whether the species should be placed among those with woolly throat hairs cannot be determined from the description. The anthers are glabrous.

54. **S. Horsfieldiana,** *Miq.* in Flor. Ned. Ind. ii. p. 379; A. W. Hill in Kew Bull. 1911, p. 294.

Java. Depok (Buitenzorg), *Koorders* 81; Banyumas, *Koorders* 82 and other specimens cited in *K.B.* l.c.

The calyx segments except for the margins are glabrous. In the corolla the line of hairs occurs about one-third of the way up the lobes and the anthers are inserted in the sinuses.

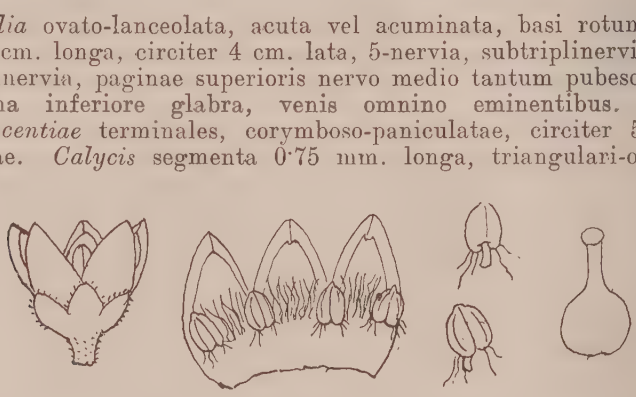
55. **S. palembanica,** *Miq.* in Flor. Ind. Bot. Suppl. pp. 227, 551; A. W. Hill in Kew Bull. 1911, p. 293. *S. pilgeriana*, Gilg in Notizbl. der Kgl. Bot. Gart. Berlin, 1897, no. 8. p. 268.

Sumatra.

The calyx segments are hairy on the outside. The arrangements of corolla hairs and position of the anthers is similar to that which obtains in *S. Horsfieldiana.*

56. **S. luzonensis,** *Elmer* in Leaflets Philip. Bot. i. (1908), p. 332, partim; descr. emend.

Folia ovato-lanceolata, acuta vel acuminata, basi rotundata, 8-10 cm. longa, circiter 4 cm. lata, 5-nervia, subtriplinervia vel triplinervia, paginae superioris nervo medio tantum pubescente, pagina inferiore glabra, venis omnino eminentibus. *Inflorescentiae* terminales, corymboso-paniculatae, circiter 5 cm. longae. *Calycis* segmenta 0·75 mm. longa, triangulari-ovata,



acuta vel subacuta, marginibus ciliatis. *Corolla* 2 mm. longa, lobis circiter 1·4 mm. longis versus basin linea pilorum erectorum notatis. *Antherae* 0·5 mm. longae, basi barbatae, filamentis 0·5 mm. longis paullo sub sinubus insertis. *Ovarium* globosum cum stylo glabrum, circiter 1 mm. longum; A. W. Hill in Kew Bull. 1911, p. 297. *S. multiflora,* Benth. quoad *Elmer* 7885, A. W. Hill l.c.

Philippine Islands. Luzon: Lucban; Tayabas, *Elmer* 8251; *Curran* 19159.

Elmer has included two different plants in his original description (see A. W. Hill, *K.B.* l.c.). He has also overlooked some interesting features of this species. The leaves are peculiar in that the median nerve only on the upper surface is pubescent while the under surface is glabrous. Then in the flowers there is a line of erect hairs across the corolla lobes near the base. The anther filaments are inserted just below the sinuses, and the anthers are bearded at the base, none of these features being recorded in the original description. In *K.B.* 1911, p. 297 it was suggested that *S. luzonensis* might be allied to *S. multiflora,* but a further study of the flowers shows the error of this view since the corolla lobes are furnished with a transverse line of erect hairs, the anthers are bearded and the ovary glabrous.

57. **S. impressinervis,** *A. W. Hill*; species ex affinitate *S. Wenzelii,* Merr., foliis ovato-lanceolatis acuminatis calycis segmentis late ovatis marginibus membranaceis floribus majoribus praecipue differt.

Frutex scandens (?), ramis in juventate minute pubescentibus. *Folia* ovato-lanceolata, sensim acuminata, 8·5-13 cm. longa, 3-5·7 cm. lata, basi plus minusve rotundata, glabra, in siccitate fusca, pagina superiore vernicosa, inferiore fusco-hebetia, triplivel subtrinervia, nervis paginae superioris impressis venis distantibus inconspicuis; petioli 5 mm. longi, minute

pubescentes. *Inflorescentiae* axillares vel terminales, 1·5-2·2 cm. longae, corymbosae, pauciflorae, pedunculis pedicellisque pubescentibus. *Calycis* segmenta conspicua, late ovata, subacuta, basi rotundata, circiter 2 mm. longa, marginibus membranaceis ciliatis. *Corolla* 4-4·5 mm. longa, lobis 2·25-2·75 mm. longis crassis intus medio linea pilorum erectorum curvatim notatis. *Antherae* ovoideae, 0·75-0·9 mm. longae, basi barbatae, filamentis brevissimis in sinubus insertis. *Ovarium* cum stylo circiter 1·5 mm. longum, glabrum.

Philippine Islands. Palawan: Taytay, *E. D. Merrill* 9401.

This species shows some resemblance to *S. Wenzelii* Merr., from the island of Leyte, but without fruits of either being known it is impossible to say whether there is a very close affinity between them. The Palawan plant is distinct in the dull-brown colour of the under surface of the leaf, the conspicuous widely overlapping calyx segments rounded at the base and in having the pencil or line of erect corolla hairs somewhat curved.

58. **S. mucronata,** *A. W. Hill;* species foliis breviter ovatis emarginatis griseis glabris, inflorescentiis 3-5-floribus distincta.

Frutex scandens, ramis et ramulis tenuibus striatis dense pubescentibus. *Folia* breviter ovata, 3-4 cm. longa, 2-3 cm. lata, apice rotundata, emarginata, mucronata, basi rotundato-cuneata, trinervia, venis reticulatis, glabra, griseo-viridia, marginibus reflexis; petiolis 2-3 mm. longis, cirrhis simplicibus axillaribus hirsutis. *Inflorescentiae* axillares, 3-5-florae, pedunculis glabris. *Calycis* segmenta late orbicularia, subacuta, glabra, marginibus membranaceis ciliatis. *Corolla* immatura circiter 2 mm. longa, lobis 1 mm. longis linea pilorum basi notatis. *Antherae* 0·75 mm. longae, ovatae, basi et secus rimum barbatae. *Ovarium* cum stylo glabrum. *Fructus* ignotus. *S. pubescens*, Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 16 et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 165 partim.

Cambodia. Angcor, *Thorel* in herb. Mus.. Paris, Brit. et Edin.

This is a very distinct species with its small, broadly-ovate, emarginate, trinerved leaves, glabrous and ashy-grey in colour. It is quite unlike *S. pubescens*, C. B. Clarke, though from its flowers it belongs to the same section of the genus.

59. **S. oophylla,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 170 with figs.

New Guinea. Kaiser-Wilhelmsland: Hunsteinspitze; mossy virgin forest, 1300 m., *Ledermann* 11294 (Fl. Mar.).

The anthers are markedly apiculate, bearded at the base and inserted in the corolla tube. The corolla lobes, judging from the figure, have a line of erect hairs near the base.

60. **S. melanocarpa,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 172.

New Guinea. Kaiser-Wilhelmsland: Hauptlager Malu on the Sepik; in old secondary alluvial forest, 20-40 m. *Ledermann* 10804 (Fl. Feb.); near Malu, open forest, 50-100 m. *Ledermann* 10861 (Fl. Feb.); Seerosensee Black river, patches of forest, 20-40 m. *Ledermann* 10911 (Fl. Feb.).

61. **S. polytoma,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 173, with figs.

New Guinea. Kaiser-Wilhelmsland: Hunsteinspitze; Quellenlager, in open rocky primitive forest, 700 m. *Ledermann* 8391 (Fl. August.).

The line of long erect hairs across the bases of the corolla lobes is well shown in the figure. The anthers are inserted in the corolla tube and are markedly apiculate and bearded at the base. This and the preceding closely allied species, appear to be peculiar in this section in having the ovary shortly hairy.

Section iv. **Tubiflorae.**

62. **S. angustiflora,** *Benth.* in Journ. Linn. Soc. i. p. 102; descr. emend.

Frutex scandens, cirrhis simplicibus. *Folia* trinervia. *Corolla* 0·95-1 cm. longa, lobis reflexis 5-5·5 mm. longis ad basin et tubo ad faucem laneo-hirsutis. *Antherae* 1·75 mm. longae, subversatiles, filamentis 4 mm. longis. *Ovarium* glabrum, stylo 8 mm. longo glabro. *Fructus* globosus, 3·5-4 cm. diametro; pericarpium crustaceum, tenue. *Semina* 1-2, orbicularia, 1·1-1·3 cm. diametro, plana, margine acute

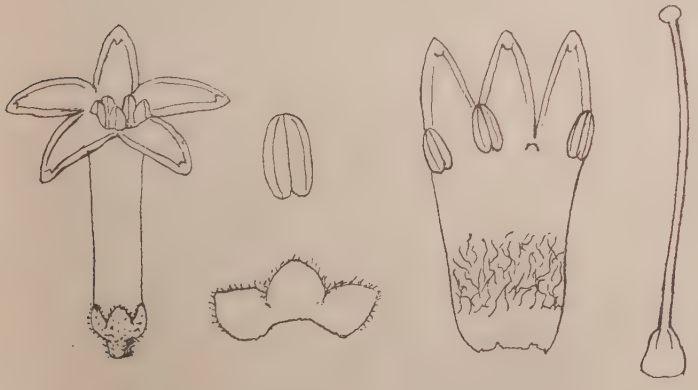
carinato ambitu instructa indumento contexto obtecta. Benth. Flor. Hongk. p. 232; Forbes & Hemsley in Journ. Linn. Soc. xxvi. p. 121 et Ind. Flor. Sin. ii. p. 121; Walp. Ann. v. p. 508; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910) p. 15. *S. colubrina*, var. ? Benth. in Hook. Kew. Journ. Bot. v. p. 56; Dunn & Tutcher, Flora of Kwantung and Hong Kong, Kew Bull. Add. ser. x., 1912, p. 174.

China. Hongkong. *Champion* 197, 438; *Urquhart* (1861); *Hinds* 1847; *Wright* 268, 268a, 269; *Wilford* 353; *Beechy* in herb. Univ. Glasgow; *Weiss, Hance* in herb. Mus. Paris.

The inflorescences terminate leafy axillary shoots as in *S. Nux-vomica*. The corolla is long and cylindric but, owing to splitting, the lobes are equal in length to the tube. The fruits are 3·5-4 cm. in diameter, like a small orange and full of pulp with a thin, smooth, crustaceous pericarp. One or two seeds are borne in the fruit and they resemble those of *S. Nux-vomica* in being circular and flattened with a sharpened edge. They measure from 1·1-1·3 cm. in diameter and are covered with a dense felt of short hairs. It is not recorded whether the seeds contain any appreciable quantity of strychnine or other alkaloids.

Mr. Tutcher, Superintendent of the Botanical and Forestry Department, Hongkong, informs us that *S. angustiflora* is known by some of the Chinese as the 'Ma tsien tsze' plant; this being the Chinese name for *Nux-vomica*.

63. **S. Nux-vomica,** *Linn.* Spec. 271; G. Don, Dict. iv. p. 65; Clarke in Hook. f. Flor. Brit. Ind. iv. p. 90—syn. Kurz, For. Flor. ii. p. 166, *S. lucida,* Wall. Cat. 1590 et loc. Tenasserim excl.; Bedd. Fl. Sylv. ii. t. 243 et Brandis, Indian Trees, p. 473, spec. Burm. excl.; Trimen, Fl. Ceylon, pt. iii. p. 175; Dalz. & Gibs. Bombay Flora, p. 155; Benth. in Proc. Linn. Soc. i. p. 103, spec. ex Moluccis excl.; Miq. Flor. Ned. Ind. ii.



Details of flower of *S. Nux-vomica* for comparison with those of *S. Nux-blanda.*

p. 378 partim; Cooke Fl. Bombay ii. p. 185; Dunstan & Short, Pharm. Journ. xv. ser. iii. p. 1 et Icon.; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 18 spec. Birman. *Anderson, Pierre* 3693 et var. *grandiflora* excl.; Dop in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 168 spec. Siam., spec. *Pierre* (sub var. *oligosperma*), et var. *grandiflora* excl. Bourdillon, Forest Trees Travancore, p. 269; non Kurz, For. Fl. Brit. Burma, ii. p. 166; non Craib in Kew Bull. 1911, p. 421. *S. Nux-vomica* var. *oligosperma*, Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, p. 18 et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 169 spec. *Pierre* excl.

India. Madras: Travancore: Bengal.

Ceylon.

Indo-China. Cochin-China: *Pierre* 3689; Lefèvre 385; *Thorel* 1026 in herb. Mus. Paris; *Jumelle* (semina) in herb. Kew. Cambodia spec. ex *Jumelle* in herb. Kew. Laos: *Thorel* in herb. Mus. Paris.

An examination of the rich material of *S. Nux-vomica* from Calcutta brought to light the interesting fact that *S. Nux-vomica*, Linn. is confined to India and Ceylon and that the Burmese plant hitherto referred to this species is quite distinct. The differences are pointed out in the note under *S. Nux-blanda*, A. W. Hill, which may perhaps be considered the eastern representative of *S. Nux-vomica*.

The fruit of the true *S. Nux-vomica* varies in size from that of a large to a small orange, according to Dunstan & Short l.c. A diameter of 5·6 cm. appears to be exceptional, and more usually they are about 3·5-4 cm. in diameter. The number and size of the seeds is also variable, 4 being the average number of good seeds. The circular button-like seeds with their satiny coats are easily distinguished from those of *S. Nux-blanda*.

The seed figured in Hortus Malabaricus, viii. t. 24, is very like that of *Nux-vomica*, and it is possible that the fruits and seeds of the three Malabar species were mixed by the early collectors (see under *S. Rheedii*, p. 208).

Roxburgh's note attached to *S. Nux-vomica* inserted by Carey under the description of *S. colubrina* (Fl. Ind. ii. p. 264), may refer either to a form of *S. Nux-vomica* or to *S. potatorum* as these are the only two tree species of *Strychnos* known from the eastern side of India. Don (Dict. iv. p. 65), quotes Roxburgh's note under *S. colubrina* giving the locality Coromandel, no doubt to include Roxburgh's unknown tree.

As to the occurrence of *S. Nux-vomica* in the wild state in Indo-China considerable doubt has existed and Dop's account is not very helpful, especially when it is found that some of the specimens cited do not belong to *S. Nux-vomica* and that his variety *grandiflora** must be referred to *S. Nux-blanda*.

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* Dop. in Bull. Soc. Bot. Fr. lvii, Mém. 19, p. 18.

Loureiro however (Fl. Cochin. i. (1790) p. 125), gives the habitat of this tree as the woods of the province of Binh Klang and De Lanessan* states that it is common in some parts of Cochin-China, adding that its vernacular name is "Cay-cu-chi."

According to Garnier (Indo-Chine, ii. p. 429), *Nux-vomica* is largely exported from Cambodia to China, and Niederlein, "Ressources végétales des Colonies Françaises" (1902, p. 56), also mentions that seeds of *S. Nux-vomica* are represented from Cambodia and Cochin-China in the collection of the Minister of the Colonies in Paris.

There can be no doubt therefore that *S. Nux-vomica* grows in Cochin-China but whether it is really indigenous or the result of introduction is somewhat difficult to determine.†

The wide gap in the distribution of the species does however suggest that the occurrence of the plant in French Indo-China may be due to some early introduction from Ceylon or India and the long-known medicinal properties of the seeds lends some further support to the view that it may have been introduced by early traders or missionaries voyaging from Ceylon or S. India to the East.

Mager (Atlas Colonial, 1885, p. 1), in his description of Cambodia refers to the ancient intercourse between Ceylon and Cambodia, the earliest record of which appears to be the introduction of Buddhism from Ceylon in the IVth Century. It may be that about that time or on some later occasion *Nux-vomica* was brought from Ceylon and that its cultivation was taken up on the granitic hills of Cochin-China whence most of the specimens now recorded from the country have been derived.

The drug has been known to the Chinese for a long time, and it is possible that Nux-vomica seeds may have reached China by another route, for F. P. Smith in his Contributions towards the 'Materia Medica & Natural History of China,' 1871, p. 156 (which Bretschneider remarks is a mine of scientific confusion), states that *Nux-vomica* "is brought from Sech'uen, but it originally came from some Mohammedan country in Central

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* "Les Plantes utiles des Colonies Français," Flore Cochin. p. 776 (Paris, 1886).

† The following letter from Prof. H. Jumelle, Director, Colonial Museum, Marseilles, is of interest in this connection:—

"Toutes les publications sur la flore ou sur les produits de Cochinchine indiquent, en effet, le *S. Nux-vomica* comme indigène, mais j'ignore s'il y a eu un controle bien sur à cet égard et s'il ne s'agit pas d'une erreur répétée par tous.

"En tout cas, aucune statistique douanière aussi bien indo-chinoise que française ne mentionne une exportation des noix vomiques. Mais elles peuvent être comprises sous la rubrique générale: *Espèces medicinales*, etant donné le pas d'importance de ce mouvement.

"M. Brenier, ancien directeur des services agricoles de Cochinchine et chef de la statistique que j'ai consulté à ce sujet, ne possède aucune donnée sur ce commerce, et c'est cependant certainement la personne la plus documentée sur ces questions.

"Voilà malheureusement tout ce que je puis vous dire; il s'agirait tout au plus d'un commerce très secondaire."

Asia."* Soubeiran & Thiersant, 'La Matière médicale chez les Chinois,' 1874, p. 176, possibly copying from Smith, to whom they refer, state that *Nux-vomica* was introduced into China from the Mohammedan countries of Central Asia. Should these two references be reliable it would indicate that the seeds of *Strychnos Nux-vomica* entered China by way of the caravan routes of Central Asia, possibly via Khabul. But this would not preclude the possibility that they also found their way to China by the sea route from Ceylon or S. India, which is no doubt the principal trade route for the seeds at the present day. In an earlier French account of Chinese Pharmacy by M. Debeaux† it is recorded under "*ma-tsien-tze* semences de Noix-vomique," 'La noix-vomique est introduite depuis longtemps

* The following letter received from Mr. W. J. Tutcher, Superintendent, Botanical and Forestry Department, Hongkong, is of interest with reference to the statement that *Nux-vomica* comes from Szechuen—

"Seeds of *Strychnos Nux-vomica* can be purchased in the local Chinese drug shops, but all the information obtainable from the sellers is that they get them from Szechuen.

"The province of Szechuen has a great reputation for vegetable drugs amongst the Chinese, and probably this is the reason the Chinese druggists say they get the seeds from that province.

"Another reason why they say they come from Szechuen is that seeds of *Momordica cochinchinensis* are often sold as *Strychnos* seeds, and it is possible that the *Momordica* seeds do come from that place, although I have no information on the subject.

"Since receiving your letter, on sending for *Strychnos Nux-vomica* seeds, I obtained seeds of the *Momordica*.

"In Porter Smith's 'Materia Medica of China,' p. 156, you will notice that the Chinese names of *Nux-vomica* are given as *Fan-muh-pieh* and *Ma tsien tsze*. Porter Smith also mentions, at the same place, that seeds of *Muricia* (*Momordica*) are often confounded with *Strychnos*.

"In Hanbury's Science Papers, p. 230, the Chinese names of *Muricia* (*Momordica*) are given as *Muk-pee-tsze* and *Fan-muh-pee*.

"The seeds I have just obtained [*Momordica*] were supplied as those of *Strychnos*, but with the Chinese name of *Muh-pee-tsze*.

"This is undoubtedly the proper Chinese name for these seeds.

"In the foregoing Chinese names *fan* means foreign and *tsze* means seeds.

"The correct Chinese name of *Strychnos Nux-vomica* seeds is certainly *Ma-tsien-tsze*.

"I am informed by the Imports and Exports Office, Hongkong, that seeds of *Momordica cochinchinensis* are imported as *Strychnos Nux-vomica* seeds under the name of *Muk Pit Tsze* from Annam and Haiphong.

"Seeds of *Strychnos Nux-vomica* were (and still are) obtainable in Hongkong, and it is probable that they come from India.

"In a note I have received from Mr. A. N. Pullen, Government Apothecary, Hongkong, he says '*Momordica cochinchinensis* seeds are certainly poisonous and appear to contain alkaloids similar to if not identical with those contained in *Strychnos Nux-vomica*.'

"Some of the Chinese druggists say that *Ma tsien* seeds can be obtained from plants growing in Hongkong, but so far I have been unable to obtain any of these seeds from the druggists.

"It is quite probable that they refer to seeds of *Strychnos angustiflora*, as the seeds of this plant are hardly distinguishable superficially from seeds of *Strychnos Nux-vomica* except that they are smaller.

"I know that *Strychnos angustiflora* is known by some of the Chinese as the *Ma tsien tsze* plant."

† Debeaux, J. O. Essai sur la Pharmacie et la matière médicale des Chinois, 1865.

dans la matière Médicale Chinoise, ainsi que la fève Saint-Ignace." St. Ignatius Beans from the Philippines of course came by sea and there can be little doubt that *Nux-vomica* also has largely been carried by trading junks to Hongkong or some other Chinese port.

It is curious that, though *Nux-vomica* appears to have long been known to the Chinese, Bretschneider makes no reference to the drug.

It is therefore impossible to say how *Nux-vomica* first became known to the Chinese, and whether it is really indigenous in Cochin-China or, as seems more probable, that it has been introduced there by human agency.

Prof. H. Jumelle, Director of the Colonial Museum, Marseilles, has very kindly sent samples of "*S. Nux-vomica*" seeds from Cochin-China and from Cambodia to Kew, and the seeds are certainly those of true *Nux-vomica*.

Prof. Greenish, of the Pharmaceutical Society, London, who has kindly examined the two samples of seeds, informs me that the alkaloids Strychnine and Brucine occur in about normal proportions in both samples. In this connection it is of interest to recall the following paragraph from a letter written by M. Pierre, from Saigon, to Sir Joseph Hooker, which is published in the *Kew Report*, 1877, p. 31:—

"The bark of *Strychnos Nux-vomica* is regarded in Cambodia and Siam as a poison no less certain than that extracted from the seeds. The natives have remarked the fact, which is also believed to hold good in the case of Cinchonas, that the bark has the most powerful properties when it has been covered with moss or otherwise protected from the action of light. In collecting the bark great attention is paid in consequence to the circumstances under which it has been produced."

From an examination of the species of *S. Nux-vomica* from Indo-China preserved at Paris there would appear to be no reason for maintaining Dop's variety *oligosperma* as both the size of the fruit and the number of seeds tends to be variable. The leaves in some of the specimens differ a little from those of the Indian collections, but the French material is insufficient for precise determination.*

French Indo-China appears to be a centre for species of *Strychnos* showing affinity to *S. Nux-vomica*, of which at present our knowledge is very meagre. Among these may be mentioned *S. donnaiensis* from S. Cochin-China (*Pierre* 3692); a subscandent plant with leaves not unlike those of some of the plants from this region assigned to *S. Nux-vomica* and with very similar seeds (see Dop l.c. p. 20). *S. usitata*, Dop, again, has

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* *Pierre* 3693 placed by Dop under his variety *oligosperma* has elliptic leaves and is apparently a climbing plant. It is certainly not *S. Nux-vomica* but may be related to *S. Pierriana*.

In Pierre's specimen No. 3689, the fruit is 4 cm. in diameter and contains two seeds. Owing to the few seeds he was doubtful if the plant were really *S. Nux-vomica*. Dop in his description of the fruit (see Lecomte, Flor. Gen. Ind.-Chin. iv. p. 168) gives 15 as the maximum number of seeds in a fruit of 4 cm. in diameter! This error is no doubt due to his inclusion of *S. Nux-blanda* as his var. *grandiflora*.

the familiar button-shaped *Nux-vomica* seeds but they are only slightly hairy with a rufous tomentum and *S. rupicola*, Dop, another subscandent species with immature flowers is evidently allied either to *S. Nux-vomica* or to *S. Pierriana*.

S. Nux-vomica also shows affinity with *S. angustiflora*, Benth., especially in its fruits and seeds and it is possible that this relationship may be traceable to a former widespread distribution of a primitive species of which *S. Nux-vomica* in India, Ceylon and Cochin-China (?)—*S. Nux-blanda* in Burmah and Siam, *S. angustiflora* in Hongkong, and *S. ligustrina* and *S. lucida* in Timor and N. Australia may be the scattered derivatives.

No particulars can be discovered as to whether the Indo-Chinese *Nux-vomica* is an article of any commercial value as no statistics appear to have been published; neither is any light thrown on the subject from the Imports and Exports Office, Hongkong.

Commercial *Nux-vomica* apparently comes almost entirely from India, and the following figures taken from the Account of the Exhibits in the Agricultural Section of the Agricultural products of the Madras Presidency (1917) pp. 29-30 are of interest:—

Nux-vomica.—*Foreign Trade.*—Separate figures prior to 1912-13 are not forthcoming.

Figures of quantities in thousands of hundredweights—000 omitted.
Figures of value in thousands of rupees—000 omitted.

Year.	Quantity in thousands of hundred-weights.	Value in thousands of rupees.	Chief countries which take the produce and percentage of exports (average of recent normal years) thereto.
1912–13	29	1,51	America (United States of America), 44 per cent.; United Kingdom, 37 per cent.; Belgium, 14 per cent.; Holland, 4 per cent.
1913–14	34	1,90	
1914–15	25	1,56	

Chief ports of export, average proportionate share of trade, methods of packing and chief months of export.

Port.	Proportionate share.	Chief months produce available.	Methods of packing.
	Per cent.		
Cochin ...	28	December to April	*Single gunny bags of 140 lb. net.
Madras ...	27	December to June	Single gunny bags of 164 lb. net.
Cocanada	23	January to June...	Occasionally Madras ships in 175 lb. bags.

* Trade is from various ports on the coast and proportions between ports fluctuate.

Grades of quality and prices in typical months.—Shipped against fair general average of season most usually Europe cleaning. It is claimed that West Coast produce is "bolder" than the East Coast.

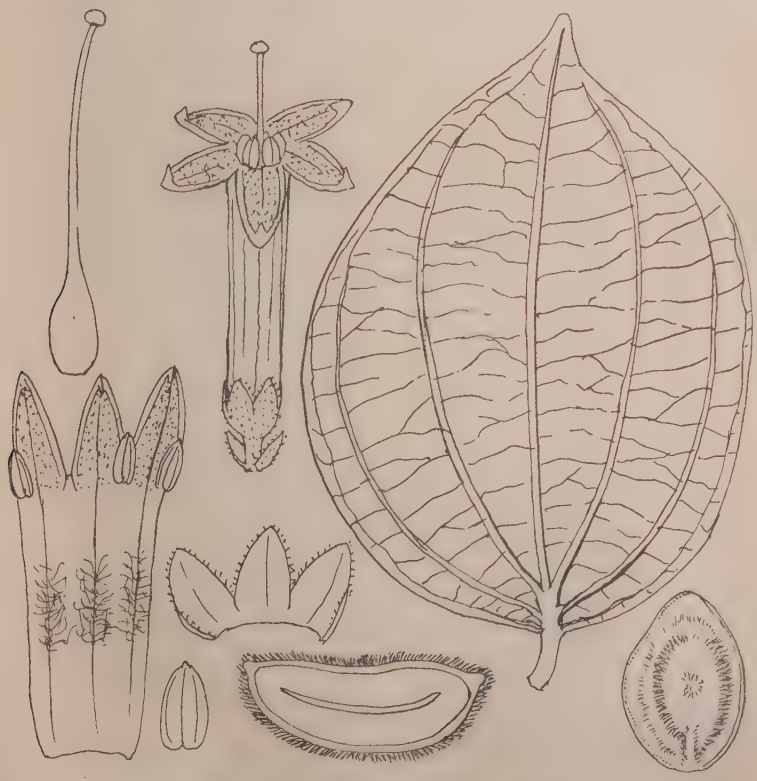
Prices—

	May, 1914.	May, 1916.
Cochin	£9	£15 a ton f.o.b. Cochin (tonnage teak Cochin 16 cwt.).
Madras	£12	£22 a ton c.i.f. London.

Freight Madras to London in 1914 was £1 17s. 6d. a ton.
Freight Madras to London in 1916 was £8 17s. 6d. a ton.
New York takes nearly all the Cocanada output.

64. **S. Nux-blanda,** *A. W. Hill*; species cum *S. Nux-vomica*, Linn., confusa et ei affinis, foliis grandibus abrupte acutis vel acuminatis, calycis segmentis lanceolatis, antheris apiculatis in tubo corollae insertis seminibusque dissimilibus praecipue differt.

Arbor parva, usque ad 15 m. alta (*Prazer*) vel frutex in locis elatioribus circiter 8 m. altus; rami glabri, cortice vernicoso obtecti. *Folia* late ovata vel elliptico-ovata, abrupte acuta vel acuminata, basi rotundata, rotundato-cuneata vel nonnumquam



The leaf is half natural size and the section of the seed is enlarged.

paullo cordata, 11-22 cm. longa, 7-16 cm. lata, glabra, superne vernicosa, tri- vel paullo triplinervia, 5-7-nervia, nervis pagina superiore paullo impressis pagina inferiore conspicuis paullo hirsutis vel glabris, venis primariis conspicuis, reticulationibus omnino plus minusve inconspicuis; petioli 1-1·5 cm. longi. *Inflorescentiae* corymboso-paniculatae, pauciflorae, 4-6 cm. longae, 2·5-4 cm. latae, ramulos axillares bi- vel 4-foliatos terminantes; pedunculi glabri vel subglabri; pedicelli papillosi vel minute pubescentes. *Calycis* segmenta anguste elliptico-lanceolata, acuta, 1·3-2 mm. longa, subglabra, marginibus ciliatis. *Corolla* alba, 1·1-1·2 cm. longa, lobis circiter 3·5 mm. longis elliptico-lanceolatis intus paullo rugoso-papillosis glabris, tubo versus basin pilis longis paullo hirsuto. *Antherae* 1·75-2 mm. longae, apiculatae, subsessiles, paullo sub sinubus insertae. *Ovarium* glabrum; stylus 0·9-1·2 cm. longus, glaber. *Fructus* globosus, 6-8 cm. diametro; pericarpium vernicosum, verruculosum, lignosum, 2-2·5 mm. crassum. *Semina* circiter 8-12, irregulariter ovoidea vel subrotundata, 1·8-2·3 cm. longa, 1·4-2 cm. lata, 6·5-8·5 mm. crassa, subcompressa, margine acute carinato ambitu instructa, indumento contexto hebete obtecta. *S. Nux-vomica*, Griffith, Icones Pl. Ind. Or. t. 411. figs. 2; Notulae, iv. p. 82; Private Journals, p. 84; A. DC. in DC. Prod. ix. p. 15 quoad spec. ex Cochinchin. (?); Kurz Rep. For. Veg. Pegu (1875), Append. A. p. xci., Append. B. p. 68; Kurz Flor. Brit. Burma, ii. p. 166; Clarke in Hook. f. Flor. Brit. Ind. iv. p. 90 quoad spec. ex Tenasserim et syn. Kurz; Craib in Kew Bull. 1911, p. 421 quoad spec. Siam.; Brandis, Indian Trees, p. 474 quoad spec. ex Burm.; Collet & Hemsley in Journ. Linn. Soc. xxviii. (1891), p. 90; Watt, Dict. Econ. Prod. Ind. vi. pt. iii. p. 379 quoad spec. Burm.; Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, p. 18 quoad spec. Birm. Anderson. Var. *grandiflora*, Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 18 et in Lecomte, Flor. Gen. Ind.-Chin. iv. p. 168 quoad *Spire* 793. *S. acuminata*. Wall. Cat. 1593 (3), A. DC. in DC. Prodr. ix. p. 14; Brandis, Indian Trees, p. 475 partim.

Manipur. Khongal Thannah & Kaboo Valley, 210 m. (Fr. Feb.), *Watt* 6628.

Upper Burma. Bhamo Dist.; Bhamo, *Griffith* 3723; towards Camein, *Griffith* 3722; Bhamo, *Burkill* 22795 herb. R.E.P.; Katha, *Burkill* 22485 herb. R.E.P.; Ruby Mines Div., Mogok, *Walsh* 27292 herb. R.E.P.; Shwegu *Asst. Conservator Forests* 27633 herb. R.E.P.; Upper Chindwin, Tamu (Fr. Dec.), *Meebold* 7589; Kachin Hills, Metkina *Shaik Mokim* 16; Kalawa Hills, *Prazer;* Shan Hills, Fort Stedman, 1200 m. (Fl. May), *Collett* 676; *King's Collector* 456; Heho, 900 m., *Collett* 59; Madoe Hill, *King's Collector* 204; Yunnan Expedition, without locality, *D. J. Anderson*; Shan Plateau, Maymyo station, *Prazer* 30; Maymo plateau, 1050 m. (Fl. May), *J. H. Lace* 6169.

Lower Burma. Pegu Dist.: Pegu Yomah; Martaban, *Kurz* 574; Pegu, *Col. Eyre* (1857); *Brandis* 680 *in herb. Sulp. Kurz*; Moulmein, *Falconer* 772; *Wallich* 1586 b (1807); Atran

Wallich 1586 a; Atran *Wallich* 1593 (3) *in herb. Wallich;* Zamayi forest *Anthony* 26030 herb. R.E.P.; Rangoon, *Cleghorn* 93; Rangoon, Tenasserim circle, *Conservator of Forests* 31718, 36721 herb. R.E.P.; Prome, *Hauxwell* 27817 herb. R.E.P.; Pyinmang, *Smales* 27378 herb. R.E.P.

Amherst Dist.: Thingau-nyi-nawny, *Burkill* 24412, 24419 herb. R.E.P.

Tenasserim: Chounguas; 1200 m., *Gallatly* 535.

Southern Shan States: Near Laikan; 840 m., *Scott* 29509 herb. R.E.P.

Siam. Prae; 150 m. (tree), *Luang Vanpruk* 460; 180 m. (shrub), *Luang Vanpruk* 197; Chiengmai, 300-600 m. (small tree or shrub fl. Apr.), deciduous jungle, *Kerr* 603.

Indo-China. Laos: Luang Phrabang; *Spire* 793 in herb. Mus. Paris.

Vernacular names.—Burmese. Khabaung, Kabaung. *Shan.* Maktiing, Khapundee (*Burkill*). *Karenni.* Diterse. *Siam.* Tung Ton. *Laos.* Kok-toung-ki.

Var. **hirsuta,** *A. W. Hill. Arbor* parva, 2-4 m. alta (*Pierre*). *Rami* et ramuli pubescentes. *Folia* late ovata, abrupte subacuta, basi late rotundata vel subcordata, 9-18 cm. longa, 5-15 cm. lata, 5-7-nervia; nervi pagina superiore sulcati, subpubescentes, inferiore prominentes, cum venis dense pubescentes. *Fructus* magnus, globosus, 5-6 diametro. *Semina* numerosa, usque ad 15 (*Pierre*). *S. Nux-vomica* var. *grandiflora,* Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, p. 18 et in Lecomte, Flor. Gen. Ind.-Chin. pt. iv. p. 169 partim.

Indo-China. Cochin-China: Bien-hoa, *Thorel.* Cambodia: Prov. Samrong-tong; Mt. Rancon, *Pierre* 3687.

Griffith in his drawing shows the character of the narrow lanceolate calyx segments very clearly and also the apiculate anthers which are inserted below the sinuses of the corolla lobes. In his notes he mentions that the tree is common in patches of jungle. His specimens at Kew are not specifically named, but in his Icones they are referred without question to *S. Nux-vomica,* Linn.

This new species, which is known in Burma as 'Khabaung,' is widely distributed throughout Upper and Lower Burma as far south as Tenasserim and extends westwards to Manipur and eastwards into Siam and Laos, with a variety in Cochin-China and Cambodia. It is as a rule a small tree according to Prazer's label, reaching a height of 50-60 ft. in the Kalawa Hills. A more normal height appears to be 20-40 ft. with trunk some 2 ft. in diameter. When collected at altitudes of about 4000 ft. it is said to be a low tree or a shrub. It appears to be fairly frequent and is found in some places as a common tree in the half-deciduous forests and it has been collected by Kerr in deciduous jungle on Doi Sutep. Kurz states that 'Kapung' is a tree 30-40 ft. high and grows in the leaf-shedding forests, and Mr. Lace writes that it is scattered about the deciduous forests of Burma. It is remarkable for its large abruptly acute or acuminate leaves with their prominent strong

nerves and inconspicuous veins, characters which enable it to be easily distinguished from *S. Nux-vomica*. With these characters and the fairly thick sharp-edged seeds, irregular in shape and furnished with a felt-like covering—quite unlike the satiny coat of the round, flattened, button-like seeds of *S. Nux-vomica**—it is surprising that 'Khabaung' should so long have been confused with the well-known species. It does not appear that the seeds have ever been commercially exported as '*Nux-vomica*,' and had this been attempted it seems hardly likely they would have been accepted by the dealers since their appearance is so different from the commercial product.†

As to the present uses of the tree, Burkill notes on his specimen from Bhamo that "Shans eat the pulp but not the seed," and Scott on his specimen 29509, from the S. Shan States, says that it is "used only as a vegetable by the natives here," but he does not indicate the part used.

Watt (Dict. Econ. Prod. India, vi. p. 382) mentions, under *S. Nux-vomica*, that in Burma the wood is used for making carts and agricultural implements and for fancy cabinet work. This statement clearly refers to the wood of *S. Nux-blanda*.

In the flowers the most striking difference between *S. Nux-blanda* and *S. Nux-vomica* is to be found in the calyx segments which are long and narrowly lanceolate, whereas in *S. Nux-vomica* they are shortly and broadly ovate. The anthers in the new species are apiculate and inserted below the sinuses; in both these respects they differ from those of *S. Nux-vomica*, where the insertion is in the sinuses and there is no apiculus.

As regards the fruits, they are as a rule larger than those of the Indian *S. Nux-vomica* and contain a greater number of seeds. If the seeds with the single fruit specimens, collected by Forest Officers in the Tenasserim circle, Burma, were derived from a single fruit there are some 8-12 or more seeds in a fruit and the seeds from one fruit weigh about half an ounce.

It is interesting to be able at last to assign to its proper place the Wallichian specimen 1593 (3)‡ from Atran, consisting of leaves only, which Wallich put under *S. acuminata*.

A sample of the seeds of 'Khabaung' was submitted to Prof. H. G. Greenish, of the Pharmaceutical Society, for analysis, and he reports as follows:—

"I have examined the seeds of *Strychnos* 'Khabaung' with the following result:—As I wished to determine the amount of strychnine and brucine (if any) present in the seeds, I followed the assay process of the British Pharmacopœia. The amount of residue (which would contain the strychnine, brucine or other

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* The seeds of *S. Nux-vomica* from Burma referred to by Dunstan and Short) see Pharm. Journ. xiii. ser. 3, p. 1053), were evidently taken from Griffith's specimen 3722, and therefore belong to *S. Nux-blanda*, A. W. Hill.

† Since the above was written seeds have been sent to the Imperial Institute from Burma as *Nux-vomica*, and were forwarded to Kew for identification.

‡ The other specimens under 1593 referred to *S. acuminata*, Wall, are 1593 (1) = *S. laurina*, Wall.; 1593 (2) = *S. rufa*, var. *Candollei* C. B. Clarke, a plant of doubtful affinity and possibly not nearly allied to *S. rufa*, C. B. Clarke.

alkaloid soluble in ether-chloroform) was quite negligible and when treated with diluted sulphuric acid and Mayer's reagent added gave no precipitate. The quantity of powdered seed operated upon was 7·5 grammes; this powder was quite free from bitterness.

"I conclude that the seeds contain no strychnine, brucine, or other alkaloid soluble in ether-chloroform; or at least that the quantity of alkaloid must be so very minute that it cannot be detected in the quantity of seed used with the process adopted."

It would appear that the seeds of *S. Nux-blanda* had previously been subjected to analysis, for Mr. J. Small's 'Note on False Nux-vomica Seed' (see Pharm. Journ. xxxvi. ser. iv. April 12, 1913, p. 510), from Burma no doubt refers to this species. He was unable to detect any strychnine in the seed.

The specific name *Nux-blanda* has been given to this new species to indicate both its long confusion with *S. Nux-vomica* and the absence of alkaloids in seeds.

With reference to the var. *hirsuta*, Pierre realised he was dealing with an undescribed species, and gave his plant the MS. name of *S. ranconensis* (on the sheets at Paris), which has never been published. The flowers, fruits and seeds agree very closely with those of *S. Nux-blanda*, but from the hairiness of the nerves of the leaf these S. Indo-Chinese plants can easily be separated as a distinct variety. Dop includes *Spire* 793 from the Prov. Luang Prabang, Laos, under his var. *grandiflora*, but this latter plant is quite glabrous and agrees with the type specimens of *S. Nux-blanda*.

65. **S. ligustrina,** *Blume* in Rumphia, i. p. 68. t. 25; Rumph. Amb. 2. p. 121. t. 38; Mal. Breyn. l.c. 19 t. 5. f. 2.; A. DC. in DC. Prodr. ix. p. 15; A. W. Hill in Kew Bull. 1911. p. 286. *S. Nux-vomica*, Benth. quoad syn. in Journ. Linn. Soc. i. p. 103 non Linn. cf. etiam C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 90 in adnot. *S. Nux-vomicae. S. Nux-vomica*, L., β *depauperata*, Miq. Flor. Ned. Ind. ii. p. 378 (?). *S. colubrina*, auct. plur. non Linn. nec Wight nec Van Roy. *S. muricata*, Kostel in Miq. Flor. Ned. Ind. ii. p. 380; DC. Prodr. ix. p. 15.

Timor. Coepang, *R. Brown* (1803) in herb. mus. Brit.; Timor, *Zippel*; Koepang, *Teysmann* 8969; Spanoghe, *Kajve Oclar* (19, 1911. 32) in herb. Mus. Lugd. Bat.

As was pointed out in Kew Bull. 1911, pp. 286, 287, *S. ligustrina* and *S. lucida* appear to be very closely allied, and it may be that we are dealing with only a single species. *S. ligustrina*, Bl., is described as a tree and *S. lucida*, R. Br., as a shrub, but the specimens sent to Kew from the Walsh River, Queensland, appear to be a tree if the wood specimen at the Imperial Institute (see under *S. lucida*) really belongs to the Walsh River specimen.

S. lucida and *S. ligustrina* can scarcely be separated on leaf and floral characters. In their fruits and seeds, etc., they show considerable affinity to *S. Nux-vomica*.

66. **S. lucida,** *R. Br.* Prodr. p. 469; G. Don. Dict. iv. p. 65; A. DC. in DC. Prodr. ix. p. 16; Benth. Flor. Aust. iv. p. 369; Bailey, Queensland Flora, iii. p. 1024; A. W. Hill in Kew Bull. 1911, p. 287.

N. Australia. Port Darwin, *Schultz* 341, 605; Carpentaria Islands, *R. Brown* 2913; Goulbourn Island, *Cunningham;* Victoria River, *F. Mueller;* Roe's River, Regent's River, *Cunningham* 321; Wyndham, *J. Stuer* (Sep. 1905) herb. Edin.; Thursday Island, *E. Cowley*; Walsh River, *T. Barclay Millar.*

In Bailey's catalogue of Queensland Woods, specimen no. 285 is said to be the wood of *S. lucida.* A specimen is now preserved at the Imperial Institute and evidently was cut from a small tree. The wood is heavy and very close grained and differs markedly from the wood of no. 286 (*S. psilosperma*, F. Muell.?).

The specimen bears on the label the locality Walsh River, and if this is the tributary of the Mitchell River rising in the hills near Cairns, the locality is so far from the N. Australian home of *S. lucida*, where it is described as a shrub, that it seems possible the wood may belong to an undescribed species of *Strychnos.*

A specimen labelled 'Walsh River,' however, and collected by Mr. T. Barclay Millar in March, 1891, appears to be identical with *S. lucida* and may be the one quoted by Bailey, so the matter is rather uncertain.

67. **S. cinnamomifolia,** *Thwaites*, Enum. Plant. Zeylan. p. 201; descr. emend. et ampl.

Folia ovato- vel elliptico-lanceolata, apice sensim acuminata vel acuta, basi cuneata, rarius rotundato-cuneata, 8-9·5 cm. longa, 3·5-4 cm. lata, triplinervia, venis approximatis. *Inflorescentiae* sublaxae, pedicellis ferrugineo-pubescentibus brevibus. *Calyx* 1·5-2 mm. longus; segmenta late ovata, subacuta vel acuta, minute ferrugineo-pubescentia. *Corolla* 1·4 cm. longa, lobis circiter 4 mm. longis. *Antherae* 1·5-1·75 mm. longae, apiculatae. *Fructus* globoso-ovoideus, 6·5-9 cm. longus, 5-7·8 cm. latus; pericarpium lignosum, 6-7 mm. crassum, laeve, vernicosum. *Semina* 8-15, irregulariter elliptica vel orbiculari-elliptica, 2-3 cm. longa, 1·3-2·4 cm. lata, subcompressa, circiter 1 cm. crassa, subbiconvexa, pilis sericeo-laneis dense vestita, plerumque margine incrassato circumcincta; C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 89 syn. excl.; Trimen, Fl. Ceylon, pt. iii. p. 174.

Ceylon. Hantani District, moist low country; 600-900 m., *Thwaites* 1867; without locality, *Gardner* 578; *Walker*; seeds (Eta-Kiunda-wel) Col. Ind. Exhib. 171, 1886 in Mus. Kew (Eta-Kirindi-wel, *Trimen*); fruits and seeds, *Petch* (recd. 1917).

Var. **Wightii,** *A. W. Hill. Folia* ovata vel late ovata, 6·5-14 cm. longa, 3·5-7·5 cm. lata, plerumque 9-11 cm. longa, 5-6 cm. lata, plus minusve abrupte acuta, basi rotundato-cuneata vel rotundata, triplinervia, venis approximatis. *Inflorescentiae* floribus congestis pedicellis ferrugineo-pubescentibus brevibus crassiusculis. *Calyx* 1·75 mm. longus; segmenta elliptico-ovata, subacuta vel acuta, minute ferrugineo-pubescentia. *Corolla* 1·4 cm. longa, lobis 3-4 mm.

longis. *Antherae* 1·75 mm. longae, apiculatae. *Fructus* 7·5-10 cm. diametro (*Bourdillon* 789 in MS. in Trav. Forest herb.), rotundato-ovoideus, circiter 8 cm. longus, 7·2 cm. latus; pericarpium lignosum, 4 mm. crassum. *Semina* (vix matura?) circiter 15, 2·5-2·8 cm. longa, plus minusve 1·5 cm. lata, ovoidea vel elliptica, compressa, 4 mm. crassa, pilis sericeo-laneis dense vestita, plerumque margine incrassato 1-1·5 mm. lato circumcincta (*Bourdillon* spec. in Mus. Kew, comm. ix. 1896); *S. colubrina*, Roxb. Fl. Ind. ii. p. 264; Fl. Ind. i. p. 577. Wight, Icon. t. 434 non Linn. *S. cinnamomifolia*, Clarke in Hook. f. Flor. Brit. Ind. iv. p. 89 quoad syn. Wight tantum non Thw.; *S. Nux-vomica*, C. B. Clarke l.c., p. 90 quoad syn. *S. lucida*, Wall. 1590 partim. *S. cinnamomifolia*, Brandis, Indian Trees, p. 475 non Thw. spec. Zeylan. excl. *S. Bourdilloni*, Brandis, Indian Trees, p. 474.

S. India. Without locality *Wight* 2286 (*K.D.* 1814); *Herb. Wight* 2286, 2288 partim and 640 (?) in herb. Glasgow. Travancore: Naunattapara; 600 m., *Bourdillon* 75, 789 (evergreen forest, flowers Feb.-April, fruits Oct., gigantic climber); 0-750 m., *Bourdillon* 759; Coorg & S. Canara (enormous creeper) *Beddome* in herb. Madras; Kottur, *Rama Rao* 489; Koni, *Thomas* (1900) herb. Travancore; Nallay Mallys, *Beddome* 5303; S. Canara, *Beddome* 5304 in herb. Mus. Brit.; Cochin, 450 m., *Meebold* 12507; Mysore: Kempkull; 600 m., *Meebold* 8543; Rajampara, *Rama Rao* 91; (Fruits), *Bourdillon* ix. 1896 in Mus. Kew; (Seed), Quilon, *Conservator Forests* in herb. Calc.

Assam. Silhet, *Smith* (Roxb. Fl. Ind. ii. p. 264); without locality, *Roxburgh* (1813) in herb. Mus. Brit.; Khasia: Pundua *De Silva.*—*Wallich Cat.* 1590 in herb. Kew. *Wallich Cat.* 1590 in herb. Edin.; Cachar 17 without collector's name in herb. Edin.

The seeds of the type which have recently been received at Kew through the kind offices of Mr. T. Petch are rather larger and thicker than those from Travancore and are unusually biconvex and about 1 cm. thick. The wall of the fresh fruit is 6-7 mm. thick and the seeds are embedded in a solid fleshy pulp. The seeds show a distinct marginal border and have a dense felt-like covering of short hairs which do not show the satiny lustre of those on the seeds of *S. Nux-vomica*. Prof. Greenish, who has kindly analysed the seeds, informs me that they contain 2·07 per cent. of alkaloid, which is brucine, the percentage of strychnine being very small. The species may be distinguished principally by its leaves, which are markedly cuneate at the base.

The drawing published by Wight in his Icones (t. 434) is a copy of Roxburgh's drawing, the original of which is at Kew. In this coloured figure the fruits are a bright orange. The diameter of the fruit figured is 4 cm. and four seeds are shown, but it is not stated whether the fruit is natural size. Bourdillon's specimens from Travancore have a larger fruit.

The specimens in the Wight herbarium at Glasgow closely resemble the plant drawn by Roxburgh, but unfortunately there is nothing to show on what specimen the drawing was based or whether it came from Silhet or from S.W. India. The Roxburgh

specimens at the British Museum bear no indication of the locality, but are named *S. colubrina* by Roxburgh himself. The specimens agree very well with his description of Smith's Silhet plant in Flor. Ind. ii. p. 264. Wight's specimens no doubt came from the Indian peninsula and they agree exactly with specimens since collected from that region; it would appear, therefore, that he was so satisfied with Roxburgh's drawing, made apparently from a Silhet plant, that he accepted it as being typical of his specimens from the Indian peninsula.

The evidence that *S. cinnamomifolia*, var. *Wightii* occurs in Assam mainly depends on the *De Silva* specimens in the Wallichian Herbarium and also on Roxburgh's statement in the Flora Indica. More definite information is to be desired, but such as it is it receives some support from the parallel case of *S. aenea*, A. W. Hill (see p. 138), which occurs in Travancore and is represented in Silhet and Cachar by a scarcely distinguishable variety. The following particulars about the Wallichian specimens throw some light on their original habitat.

In Wallich's herbarium, under the name *S. lucida* and number 1590, there is a very distinct plant since named by Bentham *S. Wallichiana*. Mounted on this same sheet, however, is the leaf of quite another species which proves to be identical with the entire specimens bearing Wallich's number 1590, preserved at Kew and at Edinburgh.

The specimens according to the label were collected at Pundua by De Silva, who certainly travelled in Silhet and not in S. India, and they agree very well with Roxburgh's drawing of *S. colubrina* (Wight's Icones t. 434).

As a further indication that Silhet is really the habitat of these specimens it is of interest to find that on the Edinburgh sheet of *Wallich* 1590 an inflorescence of *S. Wallichiana* (an undoubted Silhet plant) has been mounted among the leaves. Some correlative evidence is also afforded by the sheet of no. 1590 at the British Museum, which consists of a fragment of *S. Wallichiana*, Benth., and a large branch of *S. aenea*, var. *acuminata*, A. W. Hill (see p. 138).

S. Bourdilloni, Brandis, which is referred here to *S. cinnamomifolia* var. *Wightii*, was described from specimens with flowers in the bud stage and before the corolla tube had developed.

It seems better to refer the Indian specimens of *S. cinnamomifolia* to a variety, since they differ from the Ceylon plant in having broader leaves with more rounded bases and somewhat different seeds.

The resemblance between this species and *S. Nux-vomica* is considerable, but the latter being a tree with different leaves, fruits and seeds, can easily be distinguished from the huge climbing plant.

68. **S. rupicola**, *Pierre* ex Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 17, et in Lecomte, Flor. Gen. Ind.-Chin. iv. p. 168.

Indo-China. Cambodia. Prov. Samrong tong; Monts Pra, *Pierre* 3688.

A subscandent species with leaves like those of *S. cinnamomifolia*. The flowers are immature and fruits are unknown.

69. **S. tubiflora,** *A. W. Hill*; species *S. cinnamomifoliae*, Thw., affinis foliis ovatis venis distantibus fructibus seminibusque minoribus praecipue differt.

Folia ovata vel rotundato-ovata, 7-10·5 cm. longa, 4-7·5 cm. lata, abrupte acuminata, basi rotundata, superne vernicosa, trivel subtriplinervia, venis distantibus. *Inflorescentiae* ramulis bifoliatis axillaribus laxae instructae, pedicellis gracilibus glabris. *Calyx* 1 mm. longus; segmenta ovata, acuta, glabra. *Corolla* 1·4 cm. longa, lobis circiter 3 mm. longis, tubo ima basin hirsuto. *Antherae* 2 mm. longae, apiculatae. *Ovarium* cum stylo glabrum. *Fructus* circiter 4 cm. diametro; pericarpium crustaceum, 1·5-1·75 mm. crassum, minute verruculosum. *Semina* ovoidea, compressa, 1·8-2 cm. longa, pilis laneis intertextis vestita.

Andaman Islands. S. Andamans: Dhani Khari; hill jungle (May), *King*; Andamans, (Nov. Fr.) *Prain's Collector* 22, 84, 293.

The Andaman plant has been referred to *S. cinnamomifolia*, Thw., and is no doubt nearly allied to that species. The broadly ovate, trinerved or subtriplinerved leaves with their more distant and less conspicuous veins, the slender glabrous inflorescences and smaller fruits and seeds serve to distinguish the Andaman specimens from those of *S. cinnamomifolia* from Ceylon and Travancore.

70. **S. Pierriana,** *A. W. Hill*; species *S. cinnamomifoliae*, var. *Wightii*, A. W. Hill, et *S. rupicolae*, Pierre, affinis, ab hac foliis ellipticis pericarpio laeve, ab illa foliis trinervis praecipue differt.

Frutex scandens, glaber, ramulis cylindratis. *Folia* elliptica, basi rotundato-cuneata, apice abrupte acuminata vel acuta, 6-9 cm. longa, 3-5 cm. lata, trinervia, venis approximatis. *Inflorescentiae* ramulos axillares foliosos terminantes; pedunculi et pedicelli ferrugineo-pubescentes. *Calyx* 1·25 mm. longus, ciliatus. *Corolla* extra papillosa. 1·1-1·2 cm. longa; lobi 3-5 mm. longi, tubo intus inferne hirsuto. *Antherae* oblongae, apiculatae, 1·5 mm. longae, glabrae, paullo infra faucem insertae. *Ovarium* glabrum, stylo glabro 7 mm. longo. *Bacca* 4 cm. diametro; pericarpium 3 mm. crassum. *Semina* immatura 2·3-2·7 cm. longa, 1·5-1·8 cm. lata, complanata, pilis sericeis obtecta. *S. Gauthierana,* Pierre ex Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 17, partim et in Lecomte, Flor. Gén. Indo-Chin. iv. p. 167, partim, Pl. iii. figs. B, 1-5, non Fig. A.

Indo-China. Annam: Prov. Nghê an; Conchank *Gauthier in herb. Pierre* 1663.

The above description is only slightly altered from the MS. description at Paris written by Pierre. It is attached to a flowering specimen, apparently collected by Gauthier, included

with Lesserteur's specimens of the leaves and bark of Hoàng Nàn (see p. 203) which is the true *S. Gautheriana*. Dop also includes *Balansa* 2129 from Tonkin and has modified Pierre's description of *S. Gautheriana* to include the fruits and seeds of that species. The true fruit of Gauthier's plant with immature seeds is in the fruit collection at Paris. He does not appear to have noticed that in the Gauthier plant the inflorescences are borne on leafy shoots as in *Nux-vomica*, while in Balansa's specimen they are small axillary leafless panicles. The inflorescence of Gauthier's plant is correctly depicted in the Flor. Gén. Indo-Chin. iv. Pl. iii. fig. B, but fig. A represents the flowerless branch of *S. Gautheriana*.

Much confusion has been caused since Pierre drew up his description of *S. Gautheriana* both from the flowering plant and from specimens of the true Hoàng Nàn; moreover it would appear that both plants grow together in the same locality.

S. Pierriana shows considerable affinity to *S. cinnamomifolia*, var. *Wightii*, but differs especially in the seeds which have a silky coat and in the trinerved leaves. It is also no doubt closely allied to *S. rupicola*, Pierre, from Cambodia, of which only immature specimens have been collected.

71. **S. Wallichiana,** *Benth.* in Journ. Linn. Soc. i. p. 90; descr. ampl.

Folia elliptica, 12-14 cm. longa, 4-4·5 cm. lata, abrupte et longe acuminata, basi cuneata vel rotundato-cuneata, superne vernicosa, coriacea, 5-nervia, triplinervia, nervis intermediis proxime ad margines dispositis et ad eos subparallelis pagina superiore impressis; venis approximatis, marginibus incurvatis pubescentibus; petioli 0·5-1 cm. longi. *Inflorescentiae* longe pedunculatae, axillares, 6-10 cm. longae, corymbis 2-2·5 cm. longis multifloris, pedunculis pedicellisque pubescentibus. *Calycis* segmenta elliptica, subacuta, glabra vel subglabra, 1-1·25 mm. longa, marginibus ciliatis. *Corolla* 1·2-1·35 mm. longa, lobis 2-2·5 mm. longis reflexis subcucullatis ad basin linea pilorum laneorum dense instructis, tubo glabro. *Antherae* 0·85-1 mm. longae, glabrae, ellipticae, exsertae, filamentis 0·5-0·65 mm. longis. *Ovarium* glabrum; stylus circiter 1 cm. longus, pilis erectis versus basin dense instructus. *S. lucida*, Wall. Cat. 1590 partim* non R. Br.; Steud. ex A. DC. Prodr. ix. p. 13 partim; Clarke in Hook. f. Flor. Brit. Ind. iv. p. 90; Brandis, Indian Trees, p. 475. *S. nitida*, G. Don, Dict. iv. p. 66.

India. Silhet: Pundua, *Wallich* 1590 in herb. Wall. nec in herb. Kew nec herb. Mus. Brit. nec Edin. Assam: Mikio Hills (March), *Simons*; Margerita, Luckinpore, *C. B. Clarke* 37876 A. (sub nom. *Myxopyrum smilacifolium*) in herb. Mus. Brit.; Kufoo Forest, *Griffith K.D.* 3726. Chittagong; Pharoka, *Gamble* 6720 A. in herb. Gamble. Golaghat, *King's Collector*

* *Wallich* 1590 in herb. Wall. = *S. Wallichana*. In herb. Kew, the specimen bearing this label is *S. cinnamomifolia*, var. *Wightii* (a leaf of this is also attached to the Wallichian sheet), and at the British Museum it is partly *S. Wallichiana*, Benth., and partly *S. aenea*, var. *acuminata*.

(1891); Dibru Ghar, *Masters* 1109; Lushai Hills, Changsil, *Prazer*. Chittagong Hill Tracts, *Gamble* 6720 b.

Var. **ovata,** *A. W. Hill. Folia* late ovata, 8-11 cm. longa, 5-6·3 cm. lata, conspicue 5-nervia, sub-triplinervia, abrupte acuta, basi rotundata vel rotundato-cuneata, petiolis marginibus ut in typo incurvatis pubescentibus. *S. Wallichiana*, Steud. ex Kurz, For. Fl. ii. p. 167; Kurz, Rep. For. Veg. Pegu (1875), append. A. p. xci., B. p. 68; vide Brandis, Indian Trees, p. 474, § 2.

Burma. Pegu: Yomah, *Kurz* 2319.

Var. **intermedia,** *A. W. Hill. Folia* elliptico-ovata vel ovata, 8-11 cm. longa, 4·5-5·5 cm. lata, apice plus minusve abrupte acuta, basi rotundata, 5-nervia, triplinervia, vernicosa, coriacea, nervis vix impressis.

Chittagong. Burkul, *Lister* 321.

S. Wallichiana is a distinct plant, among the species with a long corolla tube, in having a dense line of hairs at the base of the corolla lobes, surrounding the anther filaments, and in having the lower two-thirds of the style covered with erect hairs. The ovary and the corolla tube are glabrous.

In the type specimens the two intermediate nerves run parallel to the margins of the long elliptic leaves and are placed some 5 mm. from the actual margins; the outermost pair of nerves, which are inconspicuous, run just inside the margins. In the variety *ovata* the intermediate nerves retain the elliptic outline seen in the type, but there is a broad extent of leaf lamina between them and the margin owing to the widely ovate shape of the leaf; the lamina is also much thinner. From Chittagong a plant intermediate between the type and the var. *ovata* has been collected, which is sufficiently distinct to be considered a separate variety with the name *intermedia*.

72. **S. Spireana,** *Dop* in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 19 et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 169, Pl. iii. figs. C, 6-10.

Indo-China. Laos: Tranninh; Cahn-Trap, *Spire* 1204.

According to Dop this species is distinct in having the lobes of the corolla hairy on the inside, a character however which I have failed to recognise. The leaves closely resemble those of *S. Pierriana*, but the inflorescences appear to be less pubescent. Fruits are unknown. It is very doubtful whether this is a good species.

73. **S. cuspidata,** *A. W. Hill*, in Kew Bull. 1909, p. 359; et in Kew Bull. 1911, p. 288.

Malay Archipelago. Borneo: Sarawak; Kuteing, *Beccari* 1188, 1348; Borneo Central: Ipoc Kajo, *Nieuwenhuis* in herb. Hort. Bot. Reg. (?).

The Central Borneo specimen is said to be a tall tree, as it consists of leaves only, its reference to this species must be

regarded as doubtful. Mature fruits of *S. cuspidata* are unknown. The ovary and style are glabrous.

74. **S. Balansae,** *A. W. Hill*; species *S. ovalifolia*, Wall., affinis, foliis ovatis majoribus inflorescentiis majoribus dense ferrugineo-pubescentibus seminis grandibus numerosis pilis laneis hebetibus obtectis praecipue differt.

Frutex scandens, glaber. *Folia* ovata vel ovato-elliptica, plus minusve abrupte acuminata, basi rotundata, 8-13 cm. longa, 4-6 cm. lata, glabra, vernicosa, trinervia, 3-5-nervia, venis approximatis conspicuis; petioli circiter 1 cm. longi. *Inflorescentiae* axillares, paniculatae, 2-2·5 cm. longae, pedunculis pedicellisque dense ferrugineo-pubescentibus. Calycis *segmenta* triangulari-ovata, subacuta, pubescentia. *Corolla* 1·1·3 cm. longa, lobis 5-6 mm. longis glabris, tubo interiore subtus hirsuto. *Antherae* oblongae, 2 mm. longae. *Ovarium* glabrum, cum stylo glabro 1·2 cm. longum. *Bacca* globosa; pericarpium crustaceum, laeve, circiter 1 mm. crassum. *Semina* numerosa, irregulariter elliptica, 2-2·6 cm. longa, 1·7 cm. lata, complanata, plus minusve 6-7 mm. crassa, pilis laneis hebetibus obtecta. *S. Gauthierana*, Dop in Bull. Soc. Bot. Fr. lv. ii. Mém. 19 (1910), p. 17, et in Lecomte, Flor. Gén. Ind.-Chin. pt. v. p. 167, partim. *S. Gautheriana*, A. W. Hill in Kew Bull. 1911. p. 289, partim.

Indo-China. Tonkin: Prov. Tung Tien; Vallée de Lankok (Mont Bavi); forests, *Balansa* 2129.

This species resembles *S. ovalifolia*, Wall., but is easily distinguished by its larger leaves and by the thin-walled fruits with large seeds. As all the fruits at Paris are broken neither their size nor the number of the seeds can be given.

75. **S. Ignatii,** *Berg.* Mat. Med. i. p. 146 (1778); G. Don, Dict. iv. p. 65; Oliver in Hook. Icon. t. 2212; Tavera in Med. Pl. Philipp. Is. (trans. Thomas), 1901, pp. 171-173; De Lanessan, Pl. Utiles des Colon. Franc. Flor. Cochin. 1886, p. 767; Watt, Dict. Econ. Prod. Ind. vi. pt. iii. p. 379 A. W. Hill in Kew Bull. 1911, p. 290. *Strychnos philippensis*, Blanco, Flor. Filip. ed. 2 (1845), p. 61.

Philippine Islands. Mindanao: Boxall in herb. Kew.; Lake Lanao, *Clemens* 895; Central Mindanao, *Lyon.*

Leyte: near Dagami; woody vine in forests, *Ramos Bur. Sc. No.* 15286;

Samar: Catbalogan, *Carruthers; Guerrero; Cullen* (seedlings) *Bur. Sc. No.* 10835.

Biliran: Lowland forest, *McGregor Bur. Sc. No.* 18713.

Easily distinguished from all other species by the large fruits and irregularly trigonous stony seeds. For further particulars see *K.B.* 1911, p. 290.

76. **S. Tieuté,** *Lesch.* in Ann. Mus. Hist. Nat. xvi. p. 479, t. 23; Blume in Rumphia, i. p. 67, t. 24; G. Don, Dict. iv. p. 66; A. DC. in DC. Prodr. ix. p. 13; Miq. Flor. Ned. Ind. ii. p. 380; Benth. in Journ. Linn. Soc. i. (1857) p. 103; King & Gamble in Mat. Flor. Mal. Penins. iv. p. 831 partim; non Dop in

Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 16; A. W. Hill in Kew Bull. 1911, p. 292.

Malay Archipelago. Java: *Teysmann; Hallier; Reinwardt* 1599; *Zollinger* 2635; *Horsfield* 368; *Pulle; Kurz.*

In foliage and floral character *S. Tieuté* closely resembles *S. ovalifolia*, Wall., from the Malay Peninsula; the most useful distinguishing character lies in the plano-convex seeds with their thick covering of closely felted hairs. In *S. ovalifolia* the seeds have a satiny coat. The original description and figure given by Leschenault is of a leafy specimen only. The triplinerved leaves are well drawn, and it is therefore not so surprising that Colebrooke should have suggested that his *S. axillaris* (see Trans. Linn. Soc. xii. p. 357) might be compared with *S. Tieuté*.

77. **S. ovalifolia,** *Wall.* Cat. 1592; A. DC. in DC. Prodr. ix. p. 13; G. Don, Dict. iv. p. 65; Benth. in Journ. Linn. Soc. i. p. 103; Miq. Flor. Ned. Ind. ii. p. 380; King & Gamble, Mat. Flor. Mal. Penins. iv. p. 826 partim (*Curtis* 3044 et *King's Coll.* 4865 excl.). *S. laurina*, C. B. Clarke in Hook. f. Flor. Brit. Ind. iv. p. 88 (quoad *S. ovatifolia*! *Wall. Cat.* 1592). *S. pseudo-tieuté*, A. W. Hill in Kew Bull. 1911, p. 287. *S. Tieuté*, King & Gamble in Mat. Flor. Mal. Penins. iv. p. 831 partim, non Lesch. in Ann. Mus. Hist. Nat. xvi. p. 479, t. 23; P. Dop in Mem. 19, Bull. Soc. Bot. Fr. lvii. p. 16. quoad *S. Maingayi* var.? *fructuosa*, C. B. Clarke et *Beccari* 1580. *S. Beccarii*, Gilg in Notizbl. der Kgl. Bot. Gart. Berlin, no. 8 (1897) p. 267; A. W. Hill in Kew Bull. 1911, p. 291.

The following emendation to the description in *Kew Bull.* 1911, p. 287 (*S. pseudo-tieuté*) is necessary.

Folia 5·5-12 cm. longa, 2·8-6·5 cm. lata. *Inflorescentiae* usque ad 3 cm. longae, pedunculis 0·5-2 cm. longis glabris vel subglabris, pedicellis ferrugineo-pubescentibus. *Corollae* tubus intus versus basin pilis paucis instructus. *Antherae* apiculatae. *Semina* pilis sericeis nitentibus dense vestita.

Malay Peninsula. Perak: Larut; 450-610 m. (open jungle clinging to trees) *King's Collector* 5348; *King's Collector* 10595 (large creeper 18-30 m. long).

Penang: *Wallich* 1592 in herb. Wall.; Government Hill 30-60 m., *Curtis* 3468; 300 m. *Curtis* 709*; Experiment nursery 600 m. *Curtis* 1490 (a climber); Government Hill, *Maingay* 2286 (*K.D.* 1038). Penang Hill, *Ridley* 9358; Moniots Road *Ridley.*

Malacca: *Maingay* 3289 (*K.D.* 1037); Bukit Sidanan Reserve, *Corporal Hasan* (*local name* Ipoh Akar Buah Kechil); Sungei Udang Reserve, *Corporal Ali* (*local name* Ipoh Akar).

Singapore: Garden Jungle, *Ridley;* without locality, *Cantley* 176 in herb. Kew; *Ridley* 2746, 5645 A in herb. Mus. Brit.

Malay Archipelago. Borneo: Sarawak, *Beccari* 1580; 3767; Amai Ambit, Maudai River, *Hallier* 3153 B. (?)

Bentham suggests that Wallich's *S. ovalifolia* is allied

* In *Kew Bull.*, 1911, p. 287, this number was wrongly cited as *Curtis* 700.

to *S. Wallichiana* but the character of the leaves, calyx and style do not suggest that this is a real affinity. I can find no real difference between *Wallich* 1592 and the various plants referred to *S. pseudo-tieuté*, A. W. Hill, and have therefore included this species as a synonym of *S. ovalifolia*. The condition of the Wallichian specimens is unfortunately imperfect, neither whole flowers nor fruit being present, but the only differences between the two species are the long, lax inflorescences and the rather larger leaves of Wallich's plant. In all the specimens previously placed under *S. pseudo-tieuté* the main peduncle is stout and does not exceed 1 cm. in length, the inflorescence being a compact panicle. In Wallich's plant the inflorescence is a lax corymb, borne on a long slender peduncle which may be due to conditions of dense shade. In all cases however the main peduncle is glabrous or subglabrous the pedicels and calyces being ferrugineous-pubescent.

Under *S. ovalifolia*, King and Gamble include *King's Coll.* 4865 and *Curtis* 3044, but I have referred both of these to my new species *S. quintuplinervis*. Their description of the fruit and seed of *S. ovalifolia* therefore, which was drawn up from *King's Collector* 4865, applies to *S. quintuplinervis*, and not to *S. ovalifolia* (see p. 166).

The fruit of *S. ovalifolia* is correctly described under *S. pseudo-tieuté*, A. W. Hill in *K.B.* 1911, p. 287, and is remarkable for its thick woody pericarp.

I can also find no essential difference between *S. ovalifolia*, from the Malay Peninsula and *S. Beccarii*, Gilg, from Borneo and have therefore merged the latter species in *S. ovalifolia*. The seeds with their satiny coat distinguish this species easily from *S. Tieuté* from Java in which the seeds are covered with a thick woolly felt.

Bentham* suggests that Wallich's *S. acuminata* from Amherst should be referred to *S. ovalifolia*. It is a leaf specimen only and is here considered to belong to *S. laurina*.

SPECIES NON SATIS NOTAE.

78. *S. rufa*, C. B. Clarke.
79. *S. narcondamensis*, A. W. Hill.
80. *S. Gautheriana*, Pierre.
81. *S. quadrangularis*, A. W. Hill.
82. *S. tesseroidea*, A. W. Hill.
83. *S. monosperma*, Miq.
84. *S. myrioneura*, Gilg.
85. *S. Thorelii*, Pierre.
86. *S. polyantha*, Pierre.
87. *S. donnaiensis*, Pierre.
88. *S. usitata*, Pierre.
89. *S. dinhensis*, Pierre.
90. *S. leuconeura*, Gilg et Benedict.
91. *S. Kerstingii*, Gilg et K. Schum.
92. *S. Bancroftiana*, Bailey.

* Journ. Linn. Soc. i, p. 103.

78. **S. rufa,** *C. B. Clarke* in Hook. f. Fl. Brit. Ind. iv. p. 89; non King & Gamble, Mat. Fl. Mal. Penins. iv. p. 827.

Malay Peninsula. Malacca: *Maingay* (*K.D.* 1034).

Var. **Candollei,** *Clarke.*

Burma. Tenasserim: Amherst, *Wallich* 1593 partim.

Both are leaf specimens only, and it is very doubtful whether the Wallich specimen from Amherst is in any way related to the type plant from Malacca. The other plants placed under this name by King & Gamble, are certainly distinct and have been described under the name *S. Scortechinii*, A. W. Hill (see p. 168).

The leaves in Maingay's plant, on which Clarke founded the species, are thickly covered with scabrid pustules which are prominent on the under surface. The fruit of this same specimen is about 4 cm. in diameter, with a pericarp about 3 mm. in thickness, and contains numerous flattened seeds some 2 cm. long.

There are three doubtful leaf specimens at Calcutta, *Meebold* 15450 from Wagon, Tenasserim; a *Kurz* specimen from Tenasserim, and one collected by *Falconer* in Moulmein, all rufous-tomentose, which may be related to Clarke's doubtful plant *S. rufa,* var. *Candollei* from Amherst; they also show some resemblance to the plant from Narcondam.

79. **S. narcondamensis,** *A. W. Hill.*

Frutex scandens, ramis striatis in juventute rufo-pubescentibus. *Folia* ovato-lanceolata, circiter 9-16·5 cm. longa, 4-6·5 cm. lata, basi rotundata, apice sensim et longe acuminata, superne vernicosa, trinervia, nervis paginae superioris paullo eminentibus, paginae inferioris dense rufo-pubescentibus; petiolis brevibus dense rufo-tomentosis. *S. acuminata,* Prain in Journ. Asiatic Soc. Bengal, lxii. pt. ii. 1893, p. 73, non Wall.

Andamans. Narcondam (March, 1891) *Prain.*

80. **S. Gautheriana,*** *Pierre* MSS. ex Hook. f. Kew Report, 1877, p. 31 (nomen); Lesserteur, Le Hoàng Nàn (1879), p. 2, (descr. imperf.). *S. Gautheriana,* Pierre ex De Lanessan, Les Plantes Utiles des Colonies Français, Flor. Cochin. (1886), p. 767; ex Dop in Bull. Soc. Bot. Fr. lvii. Mém. 19, p. 17 partim et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 167 partim, Pl. iii. Fig. A tantum; A. W. Hill in Kew Bull. 1911, p. 289, quoad *Lesserteur H.P.* 1663 tantum. *S. malaccensis,* C. B. Clarke quoad syn. in Hook. f. Flor. Brit. Ind. iv. p. 89, et King & Gamble, Mat. Flor. Mal. Penins. iv. p. 829, non Benth.

Frutex scandens; rami crassi, cortice rugoso sub cuticula cinerea aurantiaco; ramuli plus minusve quadrangulares, glabri; cirrhi bijugi, incrassati. *Folia* elliptica, versus basin et ad apicem plus minusve cuneata, apice longe acuminata, 7·5-13 cm. longa, 4-5·5 cm. lata, trinervia, venis approximatis, glabra, in siccitate rufescentia. *Flores* et fructus ignoti.

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* *S. Gaultheriana* in Ind. Kew. in err.

Indo-China. Annam: Prov. Nghê an; Conchank (Lat. 19°, Long. 105°), and Thanh-hoa, *Lesserteur in herb. Pierre* 1663 in herb. Mus. Paris.

Vern. name. Hoàng Nàn.

One of the earliest references to *S. Gautheriana* (Hoàng Nàn) appears to have been in "Les Missions Catholiques" for 1875, and the following extract is taken from the *Kew Report* for 1877, p. 31:—

"*Hoàng Nàn, a supposed remedy for leprosy.*—Mr. Prestoe, Superintendent of the Trinidad Botanic Garden, has drawn my attention to some accounts given in 'Les Missions Catholiques' for 1875, describing the surprising efficacy of a drug the produce of a plant found in Cochin-China in the treatment of leprosy and rabies. The plant is known by the name of Hoàng Nàn, and the description, which is of the vaguest kind, represents it as a climber, and its bark as the efficacious portion.

"M. L. Pierre, the Director of the Botanic Garden at Saigon, has obtained an imperfect specimen of the Hoàng Nàn, and informs me that he identifies it as a new species of *Strychnos*, which he has named *S. Gautheriana*, in honour of the ecclesiastic who first gave the virtues of the Hoàng Nàn a wider publicity."*

On receipt of this information Sir Joseph Hooker appears to have written for specimens to M. Pierre, for on June 25, 1877, M. Pierre wrote to Kew as follows:—

"J'ai le regret de ne pouvoir vous envoyer des echantillons du *Strychnos Gautheriana* de seul que je posséde, tout à fait incomplet, est celui qui à servi à faire le dessin que je vous envoie.

"Cette espèce doit être considéreé sans valeur jusqu'au moment ou je pourrai en faire une description avec les caractères plus positifs que ceux fournis par les feuilles. Celles-ci me paraissent être voisines du *S. colubrina*, mais en différer par la nervation et par les vrilles."

In the Paris herbarium there are several leafy specimens of Hoàng Nàn bearing the Herb. Pierre number 1663, and with them are pieces of bark, orange-coloured below the surface. This is undoubtedly the medicinal bark whose properties are described by M. Lesserteur in "Le Hoàng Nàn," published in Paris in 1879.

It is in this publication that the first but incomplete description of *S. Gautheriana* is given, which was drawn up by M. Monrouzies, a missionary of Tonkin.

The orange bark, more or less quadrangular branches and sharply acuminate rufescent leaves of this plant are very characteristic. Mixed with these specimens at Paris, however, are two other distinct species. The one collected by *Balansa* in Tonkin has small axillary inflorescences and large irregularly oval seeds, and proves to be a new species allied to *S. ovalifolia*,

* A drawing showing the leaves, twigs and tendrils of Hoàng Nàn was received at Kew from M. Pierre in March, 1878, and it was on this drawing that C. B. Clarke made *S. Gautheriana* the synonym of *S. malaccensis* (see p. 177).

Wall. The other bears the number *Pierre* 1663, but has quite different leaves from those of Hoàng Nàn, and its leafy inflorescences are like those of *S. Nux-vomica* (see Dop in Lecomte, Flor. Gén. Ind.-Chin. iv. Pl. iii. Figs. B and 1-5). This it has been necessary to describe as a new species with the name *S. Pierriana*, A. W. Hill (see p. 197).

The confusion between these two distinct species bearing the number 1663 was the more difficult to unravel, since Pierre himself considered them to be the same plant and there is a MSS. description of the flowering specimen drawn up by him in the Paris herbarium which I have used with very little alteration for *S. Pierriana*.

Both *S. Gautheriana* and *S. Pierriana*, it appears, are found in the calcareous mountains of N. Annam, not far from the locality of the doubtful species *S. Spireana* (see p. 199).

S. Gautheriana shows considerable resemblance to some incomplete specimens collected in the Khasia Hills (also a limestone range) which have been referred to *S. aenea*, var. *acuminata*, A. W. Hill, and it also appears to be allied to *S. Vanprukii*, Craib, from Siam, *S. aenea*, A. W. Hill, from Travancore, and to *S. quadrangularis*, A. W. Hill. A further point of interest in this connection is that *S. Pierriana*, which has been collected and confused with *S. Gautheriana*, appears to be closely allied to *S. cinnamomifolia*, var. *Wightii*, which occurs in the Khasia Hills with *S. aenea*, var. *acuminata* and in S. India grows in the same places as *S. aenea* (see p. 138).

The economic properties of Hoàng Nàn are thoroughly discussed by Lesserteur. De Lanessan* also states that its bark is of a reddish-ochre colour, containing Strychine and Brucine, and is used for leprosy and skin diseases. Shoemaker† too directs attention to the use of Hoàng Nàn in skin diseases, but cannot concur in all the eulogies that have been bestowed on this bark.

81. **S. quadrangularis**, *A. W. Hill*; species ramis quadrangularibus angulis carinatis foliis ellipticis grandis distincta.

Frutex scandens, 15-22 m. longus, robustus; caules 5-6·5 cm. diametro; rami et ramuli glabri, fortiter quadrangulares, angulis carinatis. *Folia* 13-20 cm. longa, 5·5-11 cm. lata elliptica, basi rotundato-cuneata vel in foliis grandibus rotundata, in foliis parvis cuneata, apice plus minusve cuneata, abrupte et longe acuminata, glabra, pagina superiore in sicco hebetia, inferiore aenea, 5-nervia, trinervia, nervis paginae superioris impressis venis primariis approximatis cum reticulationibus conspicuis; petioli circiter 5 mm. longi. *Inflorescentiae* axillares, 4-6 cm. longae (?), pedunculis quadrangularibus minutissime pubescentibus. *Calycis* segmenta triangular-ovata, acuta, glabra marginibus ciliatis exceptis. *Corolla* ignota. *Ovarium* cum stylo glabrum. *Fructus* globosus, circiter 2 cm. diametro, monospermus; pericarpium tenue, crustaceum, verni-

* Les Plantes Utiles des Colonies Français, Flor. Cochin. 1886, p. 767.

† Shoemaker, Medical Bulletin, November, 1889, p. 348; see also Pharm. Journ. 3. xx. 1889, p. 425.

cosum (in vivo glaucum, *King's Collector*). *Semen* orbiculare, plano-convexum, hemisphericum, circiter 1 cm. diametro, 8 mm. crassum, corneum, glabrum.

Malay Peninsula. Perak: Dense jungle, clinging to large trees, limestone hills, 90-120 m., *King's Collector* 7193 (or (?) 8193); Cheroh, 60 m., *Wray* 4277; Gunong Batu Puteh, 900-1200 m., *Wray* 3, 1236; Perak, *Scortechini* 295 a.

Vernac. name. Ipoh Aker (*Wray*).

A striking plant with its large elliptic leaves, copper-coloured below when dried, and sharply quadrangular stems with conspicuously keeled angles (cf. *S. aenea*, A. W. Hill, p. 138). King & Gamble (Mat. Flor. Mal. Penins. iv. p. 826) refer to these specimens in a note under *S. laurina*, but they differ from that species not only in the characters of stems and leaves but also in the calyx and the glabrous ovary. Wray mentions that the bark of the root is used as an arrow poison by the Sakais.

According to the labels on specimens of *S. ovalifolia*, Wall., collected by Corporals Ali and Hasan in Malacca, they also bear the name 'Ipoh Akar' (see p. 201).

82. **S. tesseroidea,** *A. W. Hill*; species *S. Wenzelii,* Merrill, confusa, foliis trinervis, nervis paginae inferioris pubescentibus semineque differt.

Frutex scandens, ramis in juventute pubescentibus. *Folia* late elliptica, apice sensim acuta, basi rotundato-cuneata vel cuneata, 8-13 cm. longa, 4·2-5·8 cm. lata, superne vernicosa, glabra, nervis impressis inferne fusco-hebetia, nervis strigulosopubescentibus exceptis glabra, 5-nervia, trinervia, venis inconspicuis, petiolis et cirrhis simplicibus parce pubescentibus. *Inflorescentiae* axillares. *Flores* ignoti. *Bacca* circiter 1·3 cm. diametro, ovoidea, monosperma; pericarpium tenue, crustaceum. *Semina* tesseroidea, 9 mm. longa, 4 mm. lata, cornea, glabra. *S. Wenzelii*, Merrill in Philip. Journ. Sc. xi. No. 4. C. 1916, p. 202, partim, quoad *Ramos* 24381.

Philippine Islands. Samar: Catubig River; 80 m. (Feb. Mar.), *Ramos Bur. Sc. no.* 24381.

The plant when dry assumes a dark brown colour like *S. Wenzelii*, Merrill, but the under surface of the leaf is dull and not shining as in that species. Other differences are put forward in the note under *S. Wenzelii* (see p. 178).

There are two other distinct but imperfectly known species from the Philippine Islands which deserve brief notice, but cannot be described owing to lack of adequate material.

(1) *Strychnos* sp.

Philippine Islands. Ticao: Batuan; on the beach, *W. W. Clark* 1061.

Luzon: Prov. Albay; Castilla, *Vidal* 3936.

The leaves are ovate, acute, trinerved, and rounded at the base. The fruits small, globose, orange in colour, and the seeds circular, flattened, and about 1 cm. in diameter.

(2) *Strychnos* sp.

Luzon: Prov. Batuan; Lamao River (Sept.), *Whitford* 24037.

The leaves are ovate, acute, trinerved, and rounded at the base. Inflorescences paniculate, slender. Ovary crowned with hairs. The fruit and seeds resemble those of *S. multiflora*, Benth., but in general appearance the plant is like those mentioned above and is evidently distinct from *S. multiflora*.

83. **S. monosperma,** *Miq.* Flor. Ned. Ind. ii. p. 381; A. W. Hill in Kew Bull. 1911, pp. 294, 302.

Java.

No specimens have been seen; it is possible that it is closely allied to *S. Horsfieldiana*.

The six following species are natives of Siam or French Indo-China; reference is then made to two imperfectly known species from New Guinea and one from Queensland and a brief note is given as to an undescribed plant from Formosa.

84. **S. myrioneura,** *Gilg* in Flora of Koh Chang (Bot. Tidssk. xxxii. April, 1916), pt. x. p. 388 (312).

Siam. Lem Dam, *Schmidt* 411.

The specimen consists of leaves only—glabrous and triplinerved—and its affinity is quite uncertain.

85. **S. Thorelii,** *Pierre ex Dop* in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 20, et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 171, Pl. iii. figs. 11-13.

Indo-China. Cochin-China: Dinh Mts. *Pierre* 72.

The leaves are subtriplinerved or trinerved and the undersurfaces, nerves especially, are densely rufous-tomentose as are also the stems, petioles and tendrils. Flowers are not known. The thin-shelled fruit with its single seed is figured.

86. **S. polyantha,** *Pierre ex Dop* in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 15, et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 164.

Indo-China. Cochin-China: Dinh, *Pierre* 1721.

The leaves are trinerved with a varnished upper surface. The small axillary inflorescences are unfortunately only in young bud so that it is not possible to assign the species to its proper position. Fruits are also unknown.

Pierre describes *S. polyantha* as a tree 2-4 m. high and suggests that it is allied to *S. paniculata*, Champ. The flowers of the latter species, however, are tetramerous.

87. **S. donnaiensis,** *Pierre ex Dop* in Bull. Soc. Bot. Fr. lvii. Mém. 19 (1910), p. 20, et in Lecomte, Flor. Gén. Ind.-Chin. iv. p. 171.

Indo-China. Cochin-China: Choben, *Pierre* 3692.

The inflorescences are borne on leafy axillary shoots and the seeds resemble those of *S. Nux-vomica*.

88. **S. usitata,** *Pierre* and 89. **S. dinhensis,** *Pierre*, are also from Indo-China and are referred to by Dop l.c.

S. usitata is a very distinct species, the inflorescences are apparently borne on leafy axillary shoots and the seeds are similar in shape to those of *S. Nux-vomica* but are only slightly hairy with a rufous tomentum.

90. **S. leuconeura,** *Gilg et Benedict* in Engl. Bot. Jahrb. liv. p. 169.

New Guinea. Kaiser-Wilhelmsland: Hauptlager Malu am Sepik, 20-40 m., *Ledermann* 7133—(Fr. Apr.).

91. **S. Kerstingii,** *Gilg et K. Schum.* in Fl. Deutsch. Schutzgeb. in der Südsee (1901) p. 498; A. W. Hill in Kew Bull. 1911, p. 302; Engl. Jahrb. liv. heft iii. (1916) p. 164.

New Guinea. Kaiser-Wilhelmsland: *Kersting* 2401.

92. **S. Bancroftiana,** *F. M. Bailey* in Rep. Exped. Bellenden-Ker (1889), p. 49; Synop. Queensl. Fl. Suppl. iii. (1890) p. 47; Queensland Flora, iii. p. 1025. Pl. xliii.; A. W. Hill in Kew Bull. 1911. p. 301.

Queensland. Tringilburra Creek and Mulgrave River, *Bellenden-Ker Exped.* (1889).

The leaves are triplinerved, and not trinerved as shown in the plate. The veins are conspicuously reticulate.

Strychnos sp.

Formosa. Bankinsing Mts., *A. Henry* 1662.

This is evidently a distinct and undescribed species. The young stems and leaf petioles are pubescent as are also the nerves on the under sides of the leaves. The hairs in the latter case being relatively long and scattered. The leaves are narrowly elliptic lanceolate more or less cuneate at the base and subtriplinerved.

The fruits are about 3 cm. in diameter with a thin crustaceous pericarp.

Species Excludenda.

S. Rheedii, *Clarke* in Hook. f. Flor. Brit. India, iv. p. 87; *Modira-Caniram*, Rheede, Hort. Malab. viii. t. 24. *S. colubrina*, Dennstedt, Schlüz. Hort. Malab. (1818) p. 13.

This species was founded by Clarke on the description and figure given by Rheede and he did not assign any specimens to it. As Rheede's figure appears to be a mixture of the flowers and leaves of one species of *Strychnos* with the fruits and seeds of *S. Nux-vomica* it has seemed best to place *S. Rheedii* among excluded species as it is not possible to discover what his flowering plant may have been.

There are two large-fruited species of *Strychnos* known from S. India; the tree *S. Nux-vomica*, and the climber *S. cinnamomifolia*, var. *Wightii*, A. W. Hill. Both species have long-tubed flowers whereas the one figured by Rheede appears to have flowers with a short corolla tube. Rheede's figure of *Modira-Caniram* has been cited by Roxburgh (Fl. Ind. ii. p. 264) under his *S. colubrina* which has evidently a long-tubed flower.

Brandis in "Indian Trees" p. 474 assigns some recent specimens collected by Bourdillon, with a very short corolla tube to Clarke's *S. Rheedii*. Owing to the uncertainty as to Rheede's figure it has seemed best to describe these specimens as a new species under the name *S. aenea* (see p. 138), especially as no fruits have been collected.

With regard to the *Nux-vomica* fruits and seeds of *S. Rheedii*, Burmann, in his note to Rheede's *Modirá-Caniram**, says that the seeds both of the tree *Caniram* (vol. i. t. 37 = *S. Nux-vomica*) and of the 'herb' *Modira-Caniram* (vol. viii. t. 24 = *S. Rheedii*) are the true *Nux-vomica* of pharmacists.

The fruits of the plant figured in Hort. Malab. i. t. 37, are rather oval, and eight seeds are shown in the cross section of the fruit, but none of them are drawn separately. The fruits of the Travancore variety of *S. cinnamomifolia* are inclined to be ovoid so that the ones in this figure may belong to *S. cinnamomifolia* var. *Wightii* rather than to *S. Nux-vomica*, which species the plate otherwise certainly represents.

That the somewhat similar seeds of these two S. W. Indian species have been inter-mixed is also shown by a sample of seeds (No. 412) in the Sloane Collection in the British Museum, which consists of a mixture of the seeds of true *Nux-vomica* and

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* The following is a translation of Rheede Hort. Malab. viii. p. 47, relating to *Modira Caniram*, tab. xxiv, including Burmann's note:—

> Modira-Caniram: *Pao de Solor* or *Pao da Cobra* of the Portuguese: agrees in almost every character with the *Caniram* described already, except that *Caniram* is a tree, *Modira-Caniram* is a herb, the fruit of which has a hard greenish-tawny shell, darkening when ripe to a nut-brown, with a whitish pulp inside, whereas the fruits of *Caniram* when ripe assume a cinnabar red tinge. It gets the name *Modira* from its likeness to the beard on the upper lip [mystax], for *Modira* means moustache*. Its native habitat is about *Mangalti*, *Paroe* and other places, it flowers or fruits almost all the year round. The leaves, boiled with ginger and milk to the consistency of an ointment, drive away gout, which the Malabari term *Vilonda*; a bath made with the leaves has the same effect.

How much trouble and how many conjectures this herb has given rise to among the learned may be gathered from C. Bauhin and J. Bauhin, for this *Caniram* is a second species of that genus. The seed which is contained in the fruits of these two species is the true *Nux Vomica* of pharmacies; the first has been described under trees, and our author is the first who has prepared a true drawing and given us a true description of the plant. These seeds are quite well known in drug-stores, there indeed they are termed Vomit Nuts, Dutch Kraan-oog; the wood is the genuine *lignum colubrinum*. . . . .

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* Sir David Prain, to whom I am indebted for this translation, suggests that the name *Modira* [mystax] may have been applied to this plant because of its tendrils, which, as shown in Rheede plate, are not unlike a curled moustache.

apparently of *S. cinnamomifolia* var. *Wightii*.* These were sent to Sloane by Mr. Cunningham and bear the label "*Nux-vomica offic.*"

Specimina Excludenda.

Strychnos (?) *grandis*, Wall. Cat. 4454; A. DC. in DC. Prodr. ix. p. 17.

Penang, *G. Porter*.

This proves to be **Anisophyllea Gaudichaudiana**, *Baillar.*

Strychnos (?) no. 7500 in Wall. Cat. is of doubtful affinity but is not a member of the family *Loganiaceae*.

XX.—MISCELLANEOUS NOTES.

Munro Briggs Scott.—A particularly sad aspect of the Great War arises from the many losses of young men for whom could easily be prevised useful or even brilliant careers in the world of science. Amongst the names of these already inscribed on the Roll of Honour is that of Munro Briggs Scott, who, to our great sorrow, fell during the advance in the neighbourhood of Arras, in Easter week. Though appointed to the Kew Herbarium less than three years ago the short time he spent there was sufficient to prove that the appointment was a fortunate one for the establishment, where he quickly revealed that capacity and those traits of character that marked him out for a successful future, and those qualities of heart and mind that caused him to be greatly valued as a friend. M. B. Scott, whose home was at East Wemyss, Fifeshire, was born on April 29, 1889. Eventually becoming a student in the University of Edinburgh, from which he received the degrees of M.A. and B.Sc., he studied botany under Professor Bayley Balfour. For some time he was engaged as a teacher in a Scotch school, but preferring botanical work he competed for and won a post at Kew, and commenced his duties as an Assistant in the Herbarium on August 1, 1914. Having attested for the Army he joined the East Surrey Regiment in February, 1916, was transferred to the Suffolk Regiment, created Lance-Corporal, and recommended for a commission. This he obtained in November, distinguishing himself in the examination, and was gazetted to the Royal Scots. About the same time he was married to Miss Flora M'Donald Forbes, M.A., of Pitlochry, Perthshire, and on January 9 last joined the British Expeditionary Force in France. During an attack on April 12 he was wounded, and, while his wound was being dressed, was instantaneously killed by a high-explosive shell. Thus has ended a life of so much promise. Scott's published work consists of several diagnoses of new species which have appeared in the *Kew Bulletin*, 1914 and 1915, an article on *Diospyros Ebenaster*, Retz., contributed to the same journal (1915, pp. 65-66), and a description for the *Botanical Magazine* (t. 8653). A

* As to the alkaloid content of the seeds of *S. cinnamomifolia*, see under that species p. 195.

revision of the campanulaceous genus *Lightfootia*, which he undertook in his spare time, remains unfinished. Industrious and painstaking, possessed of more than ordinary ability, Scott, had his valuable life been spared, would have taken an important part in the best work of Kew. It has sustained a serious loss by his untimely death.

Philippe Levêque de Vilmorin.—By the death at the early age of 45 of M. Philippe de Vilmorin, Kew has lost a sincere friend and valued correspondent. Head of the firm of Vilmorin, Andrieux & Cie, the deceased had established for himself the reputation of a successful student of practical genetics. In his outdoor collections at Verrières he had also brought together a rich assemblage of living plants; at Dompierre-les-Ormes he had, besides, established an important arboretum which already includes some 900 species.

Shortly after the commencement of hostilities de Vilmorin, who in 1913 had become a member of the Académie d'Agriculture, was attached by the Government of France to their Embassy in London as Secrétaire-général de la Commission d'achats du Ministère de la Guerre. Into his new duties he threw the whole of his remarkable energy. In the course of his work he contracted influenza, followed by pneumonia, which so affected his general health that he had to be invalided to Antibes where, during his convalescence, he returned to his genetic work. After a time his health improved sufficiently to admit of his return to Verrières and his resumption of public duties. Here, unfortunately, a sudden hæmorrhage during the night of 29/30 June terminated a career already marked by solid achievement and full of promise for the future. Not France alone, but the whole civilised world is the poorer for this tragic loss, which, to those who enjoyed the privilege of de Vilmorin's friendship and thus had opportunities of appreciating at first hand the vigour of his intellect and the irresistible charm of his manner, is truly irreparable.

Clayton Beadle.—It is with great regret that we have to record the death of Mr. Clayton Beadle, on August 16th last. Mr. Beadle's name and work is familiar to readers of the *Bulletin* especially in connection with *Hedychium coronarium* and its value for paper-making. It was only this spring (*K. B.* 1917, p. 103) that we received from him for publication an interesting account of the plant growing semi-wild in Brazil, where he had recently been studying its growth with a view to its commercial possibilities. Mr. Beadle was always willing to place the resources of his laboratories at the service of Kew for the examination of any problems connected with cellulose or rubber.

Presentation of drawings.—Three interesting drawings of *Pinguicula vulgaris*, and *P. grandiflora*, found in Co. Cork and

Co. Kerry, and *P. lusitanica* from Valentia Island, by the late Miss Susan Lecky, have been presented to the Royal Botanic Gardens, and have been added to the collection of water colour drawings now exhibited in the North Gallery.

The drawings were made by Miss Lecky about 55 years ago, when she was living on Valentia Island, Co. Kerry, and have been presented by her brother, Mr. John Lecky, of 17, Hazlewell Road, Putney. Miss S. Lecky was born in Cork, in 1837, and died in London in 1896. She received much advice and encouragement in her work from the late E. W. Cooke, R.A.

Darwin Letters.—Sir William Thiselton-Dyer has presented to the Library a collection of about a hundred personal letters addressed to him by Charles Darwin between the years 1873 and 1881. Most of these are entirely in Darwin's own handwriting. Several, apparently dictated, are signed by Darwin, and some of these contain autograph postscripts. Those of more general interest have been published in "The Life and Letters of Charles Darwin", edited by Francis Darwin (1887), and in the supplementary volumes which appeared in 1903. The first letter, dated December 4, 1873, is a request for the identification of a specimen of *Cassia*, and this, like most of the others, is connected with those biological problems to the investigation and elucidation of which Darwin was devoted. "It is a dreadful evil to be so ignorant of botany as I am", he wrote in June, 1874, and on appealing for information he not infrequently concluded his letter with the expression—"Forgive me for being so troublesome". But the letters are far more than mere requests for or acknowledgments of help; they often contain allusions to experiments and discoveries of the utmost interest and importance. The last letter, dated November 16, 1881, about five months before Darwin's death, refers mainly to species of *Euphorbia* and *Asclepiadaceae* of which he was in need of material. The letters constitute a very valuable addition to the now extensive collection of original documents preserved in the Kew Library, and they are especially prized as a record of the service that Kew was able to render to our great biologist.

Gender of Sabal.—Good authorities regard it as neuter, while others equally good make it feminine. Adanson, who founded the genus, gave no indication as to the origin of its name, and having made no species supplies no help as to the gender. The first specific name showing gender was neuter (*S. carolinianum*). Sprengel, Steudel, the Index Kewensis, with a few exceptions apparently due to oversight, and the second edition of the Kew Hand list of Tender Monocotyledons (the first edition had feminine terminations) have neuter terminations. Martius (Historia Palmarum), O. F. Cook, and, amongst many others, Beccari, the author of the most recent and most important work

on the genus, have made all the specific names uniformly feminine. They do not give any explanation.

According to several writers Sabal is a South American or Mexican word.

Botanical Magazine.—The following plants are figured in the numbers for January, February and March: *Amorphophallus Kerrii*, N. E. Brown (t. 8692) from Siam; *Cytisus albus*, Link (t. 8693) from Spain and Portugal; *Cotoneaster salicifolia*, Franch. var. *rugosa*, Rehd. et Wils. (t. 8694) from Central China; *Quercus densiflora*, Hook. & Arn. (t. 8695) from N. America; *Rhododendron discolor*, Franch. (t. 8696) from Western China; *Maurandia Purpusii*, T. S. Brandegee (t. 8697) from Mexico; *Senecio Monroi*, Hook. f. (t. 8698) from New Zealand; *Pilea Forgeti*, N.E. Br. (t. 8699) from Venezuela; *Anguloa Cliftonii*. Rolfe (t. 8700) from Colombia; *Berberis Stapfiana*, C. K. Schneider (t. 8701) from China; *Clematis Fargesii*, Franch. var. *Souliei*, Finet et Gagnepain (t. 8702) from China; and *Mesembryanthemum Pillansii* (t. 8703) a native of South Africa.

In the numbers for April, May, June the plants figured are: *Rubus illecebrosus*, Focke (t. 8704) from Japan; *Senecio Hectori*, Buch. (t. 8705) from New Zealand; *Chirita Trailliana*, Forrest et W. W. Smith (t. 8706) from South-west China; *Saxifraga manshuriensis*, Komarov (t. 8707) from Manchuria and Corea; *Corylopsis Willmottiae*, Rehd. et Wils. (t. 8708) from Western China; *Vanda luzonica*, Loher (t. 8709) from the Philippine Islands; *Pyrola uliginosa*, Torr. & A. Gray and *P. bracteata*, Hook. (t. 8710 A & B) from N. America; *Plagiospermum sinense*, Oliv. forma *brachypoda* (t. 8711) from Manchuria; *Myrsine africana*, Linn. (t. 8712) found in Africa, India, and China; *Aesculus turbinata*, Blume (t. 8713) from Japan; *Stauropsis Imthurnii*, Rolfe (t. 8714) from the Solomon Islands; *Campanula Ephesia*, Boiss. (t. 8715) a native of the province of Aidin, Asia Minor; and *Disanthus cercidifolia*, Maxim. (t. 8716) from Japan.

Physiological Diseases of Plants in Nigeria.—The Annual Report on the Agricultural Department of the Southern Provinces of Nigeria for 1915 contains a summary of the results of some interesting experiments on physiological diseases of cotton and ground-nut. The diseases concerned are "leaf-curl" of native cotton and "bunching" of ground-nut, both of which were described in detail in the Mycologist's report for 1913.

The experiments indicate the important part played by the factors of soil-moisture and high atmospheric humidity in connection with physiological disturbances of this nature. As the following extracts from the report show, the two diseases in question appear to be affected in different ways by the same set of conditions:—

"The 'leaf-curl' disease of native cotton, which is prevalent in all the principal cotton-growing districts in the Southern

Provinces, does not appear to affect cotton grown in the rain-forest belt or near the coast, where more humid atmospheric conditions obtain. A series of plantings of native cotton was therefore made at intervals of approximately three weeks, from the beginning of March until the end of July, primarily to find out whether plants raised when the rainy season is well advanced, and during a period of comparatively high atmospheric humidity, would be susceptible to 'leaf-curl.' It was found that cotton planted as the rainy season advanced, up to the end of July, was least affected by 'leaf-curl.'

"It was suspected that the 'bunching' disease of ground-nuts was nearly allied in character to the native cotton 'leaf-curl,' but the results of experiments conducted during the year have given cause for a modification of this view. A series of ground-nut plantings was also made to test the humidity effect. These experiments showed that, by planting at the end of April instead of two months later, not only was the 'bunching' entirely prevented, but the yields increased to a remarkable degree, comparable with those obtained in any country where ground-nuts are produced. The difficulty of explaining why earlier planting eliminates 'bunching' is intensified by the fact that the ground-nut is a leguminous plant, and lives in symbiosis with its root-nodule organisms. Whether the ground-nut or its symbionts or both are adversely affected by too late planting remains to be proved." A. D. C.

Potatoes grown from single eyes.—The shortage of seed potatoes in the spring of 1917 created a good deal of discussion in the Press as to the advisability of cutting tubers for planting into small sections instead of planting them whole. In order to test certain assertions as to the heavy yield from small scraps of tubers containing single eyes, the following experiment was conducted under conditions available to every allotment holder.

In January 1 lb. of tubers of Kerr's Pink and 3½ lbs. of tubers of Lochar were obtained from Scotland. The Kerr's Pink were very small and were 15 in number. The Lochar were much larger, the exact number was not kept. All were at once placed in boxes and put in a light room from which frost was just excluded. Little progress in sprouting was made before the beginning of March so the boxes were placed in a warmer room for a fortnight. The sprouts were by that time ¼ in. long. The tubers were then cut into sections with one eye each except in the case of the five largest tubers of Lochar which were left whole. In this way 51 single-eye sections were procured from Kerr's Pink and 80 single-eye sections of Lochar.

The eyes were then placed in boxes of leaf mould and sand and lightly covered. They were stood in a light room in which there was a fire for several hours each day, but the boxes had eventually to be placed in a cold shed to check too rapid growth, the weather being too inclement for planting.

The ground used was part of an old market garden that had been more or less derelict for several years. It was very heavy and dirty and it had to be dug when very wet. In that condi-

tion it was too sticky to break up well and when dry it became very hard and lumpy. Planting could not be undertaken until April 20th, and on account of the poor planting condition of the soil a little fine soil from an old rubbish heap was placed in the trenches with the sets. The rows were planted 28 in. apart and the plants were placed 14 in. apart in the rows, and covered by about 3 in. of soil. The first shoots appeared above ground on May 1st, and from that time the plants grew vigorously. Before earthing up a little guano was sown between the rows but no other manure was given.

About the middle of July, and again during the second week in August, they were sprayed with Burgundy mixture but the tops did not show signs of disease. In both cases the haulms were very vigorous.

Lochar was lifted on September 15th, and yielded 197 lbs. of tubers. The largest tuber weighed 13½ ozs., and there were many between 8 and 10 ozs. There were 27 lbs. below seed size and 12 small tubers were diseased. Many tubers were affected with scab. Of the five large uncut tubers one was cut into two equal pieces at planting time, the others being planted whole. There was no difference at lifting time between the whole and the half tubers, but they bore heavier crops than the single eyes. The six sets yielded 24 lbs. 10 ozs. of tubers, but there was a large percentage of very small potatoes, each root numbering over 100 tubers.

Kerr's Pink was lifted on September 22nd and each root was weighed separately. The total yield was 157 lbs., the heaviest root yielding 7 lbs. 13 oz. Two other roots yielded 5 lbs. and 5 lbs. 10 ozs. respectively, whilst other 10 roots produced 4 lbs. or more each. Sixteen roots bore between 3 and 4 lbs. each and but two roots yielded below 1 lb. each. Those two roots were always rather weak and the tops were eventually killed by their stronger neighbours. They produced but 6 and 7 ozs. respectively. The heaviest tuber weighed 15½ ozs. and there were many tubers between 9 and 13 ozs. Seven pounds were below seed size. Seventeen tubers were affected with ordinary potato disease, and many were marked with common scab in the same way as all the varieties of potatoes grown on the same ground.

More room ought to have been allowed both between the rows and the sets for the tops became very crowded by the end of July. W. D.

Seeding and Planting in the Practice of Forestry.*—This work is dedicated to the graduates of the Yale School of Forestry and deals primarily with forestry in the United States of America although it will be found a useful book not alone to forestry students in the United States but to foresters elsewhere, for much of the matter is suitable for general application.

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* Seeding and Planting: a Manual for the Guidance of Forestry Students, Foresters, Nurserymen, Forest Owners, and Farmers. By James W. Toumey, M.S., M.A., Director of the Forest School and Professor of Silviculture, Yale University. Published by John Wiley & Sons, Inc., New York, and in London by Messrs. Chapman & Hall, Ltd. Price 16s. 6d.

In an introduction of 14 pages the past and present conditions of forestry in the United States are briefly discussed. The book, which runs to 455 pages, is then divided into two parts the first entitled "Silvical Basis for Seeding and Planting," and the second "The Artificial Formation of Woods." Each part is then divided into chapters dealing with special subjects which are again sub-divided into numbered sections with prominent headings to facilitate study.

Part i. deals largely with the formation of natural and artificial woods, their composition, etc., whilst the second part deals with seeds and seedlings from the collection of the seeds through the periods of storage, testing, sowing, transplanting, and nursery care of seedlings, to their planting in permanent positions. In this part considerable attention is also given to planting sites and their preparation for planting.

A good idea of the thoroughness with which the book has been prepared may be gathered from the sub-headings to Chap. vii. Pt. ii., on "Forest tree seed and seed collecting," among which are the following :—

1. Demand for forest seed. 2. Sources from which seed may be obtained. 5. The origin of the seed in relation to quality. 6. The size and weight in relation to quality. 8. The average number of seeds per pound. 9. The number of pounds of seed per bushel of fruit and the cost per pound. 12. Variation in the keeping qualities of different species. 17. The determination of viability. 23. Kinds of germinating apparatus. 24. Germinating tests in soil. 25. Germinating tests in media other than soil. 31. Special treatment to hasten germination. 32. The average viability of commercial seed, etc.

Tables and photographs are introduced in various places to summarise and illustrate special subjects and the book throughout is dealt with in such a manner as to be both instructive and interesting. W. D.

Farm Forestry.*—This book, written by the Professor of Forestry at the Pennsylvania State College, U.S.A., is intended as a guide to the management of woods on farms and small estates rather than a work on general forestry. Nevertheless it contains a great deal of information that is applicable to forestry in all its branches and deserves a place in the forester's library. The early chapters take a general survey of woods in connection with farms, the botanical characters of trees and their requirements, and the relationship of trees to the improvement of land, followed by chapters on various methods applicable to the establishment of farm woodlots, the conversion of timber from farm woods, the marketing of timber and the different properties of woods. Chapter xx. deals with the use of perishable woods for fence posts by treating with creosote, and ought to be of particular value to farmers both in the United States and in other countries. The chapter on the different properties of woods will also be found of considerable use by those people who are at a loss to know how to convert home-grown timber to the best advantage. Numerous illustrations add interest to the work.

* Farm Forestry, by John Arden Ferguson, A.M., M.F., published by Messrs. Chapman & Hall, 11, Henrietta Street, Covent Garden, W.C. 2. Price 6s. net.

ENNEAPOGON MOLLIS.

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